the OIL AND GAS JOURNAL

41

ECEMBER 25
1941

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You will find that BJ OIL TOOLS fit in perfectly with your drilling, coring and producing programs for 1942. They offer you new standards of ECONOMY—SAFETY—and OPERATING CONVENIENCE!

## BJ TONGS
### Types B and C

Here are those modern tongs that fit a wide range of sizes by merely changing one of the jaws: for example, the Type B fits all sizes from 3½ inches to 10¾ inches. The hinge pins operate in replaceable hardened bushings—the new rigid suspension insures perfect permanent balance. The rugged Type B is amply strong to breakout drill collars—the Type C is ideal for small drill pipe operations and portable rigs—one of them will exactly meet any need you have in 1942 for fast, safe rotary tongs.

## BJ TRIPLEX HOOKS
### Types 60-125-200

Many new features are embodied in this entirely new line of drilling and casing hooks for 60-ton, 125-ton and 200-ton loads. Kindly refer to our 2-page advertisement inside for complete details.

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### Wire Line Core Drill

With this successful device you can core or drill in any order you like without removing the drilling string from the hole. Both the coring assembly and drilling assembly are readily removed with a wire line overshot—no sticking or freezing. Cores are full-length, and even loose sands interbedded with shales are recovered. Refer to inside pages for full details.

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fit all pipe sizes from 2⅜" to 8⅝" by using one of the jaws pictured below.

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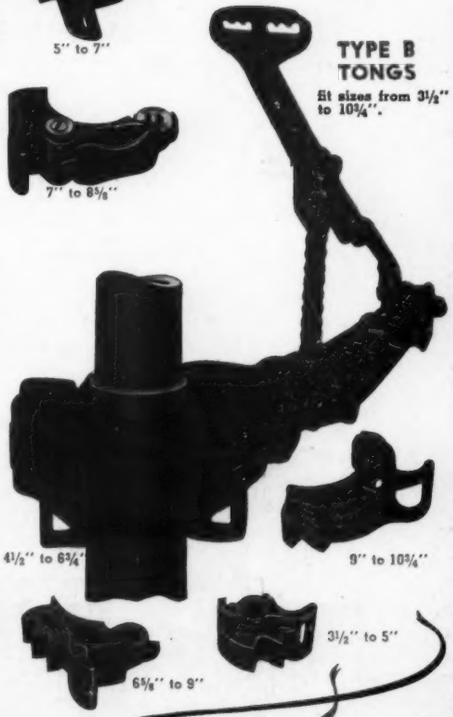


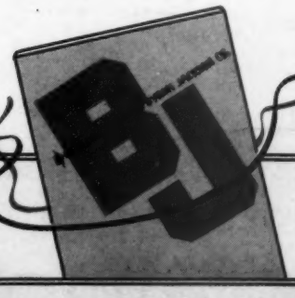


DRILLING, PRODUCTION, CORING TOOLS

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BYRON JACKSON CO.
Houston • LOS ANGELES • New York

See "ADVERTISER'S INDEX" for our two-page message inside

Vea el "Indice de Anunciantes" para nuestro mensaje de dos páginas en el interior.

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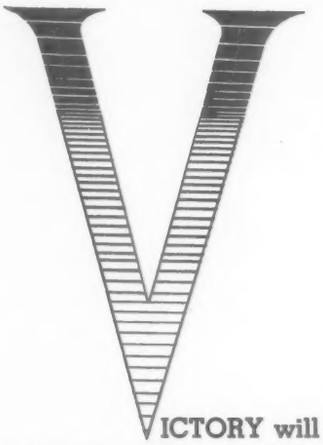
# UNCLE SAM NEEDS NEOPRENE!



VICTORY will depend greatly on the enduring quality of our ships, planes, tanks and other mechanized equipment, all of which will require large quantities of neoprene. So, for the time being, we must conserve frugally our supply of this vital material and use substitutes wherever possible. The following is quoted from a letter from the Office of Production Management dated December 10, 1941: "The increasing requirements for neoprene in direct defense products make it necessary for all fabricators to use substitutes wherever possible. This synthetic cannot be allocated for use in those products where Perbunan, Hycar, or Thiokol can be used, and it is the duty of each manufacturer as well as the purchaser to see that such substitution is made at once. The Chemical Branch is depending upon the rubber manufacturer together with the respective engineers in the consuming industry to effect these changes without delay."

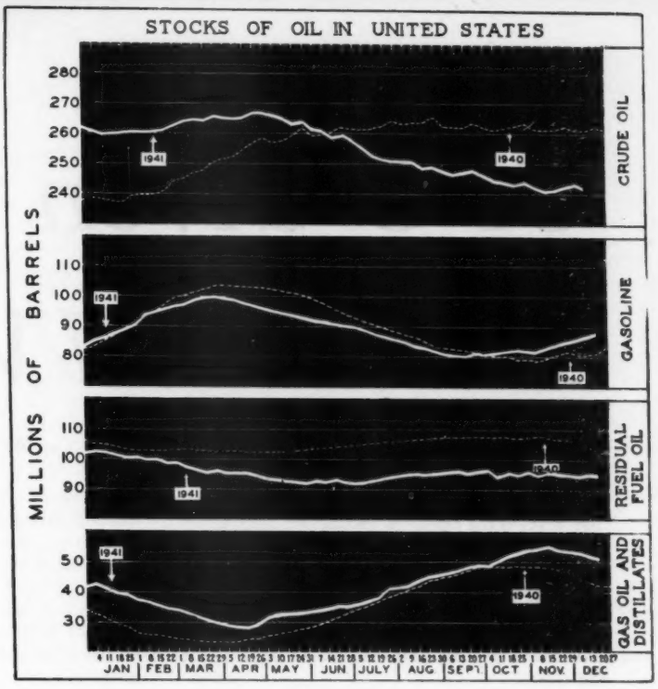
## SPECIFY HYCAR INSTEAD

Murray Rubber Company, after months of experimentation, is now prepared to furnish Hycar O.R. compounded to individual specifications. Numerous oil tool manufacturers have already switched to this new synthetic oil-resisting rubber and report highly satisfactory performance. Engineers in the consuming industry are invited to try *Murray's Hycar O.R.* compounds, an ample supply of which is assured for the present.

## MURRAY RUBBER COMPANY
## HOUSTON, TEXAS

# Trends

## Failure To Secure Decisions in Price Matters Confusing




WIDESPREAD disappointment is apparent among producers due to the delay in obtaining action regarding pending price matters. Operators have assumed that the entry of the United States into the war, with the accompanying increase in responsibilities of the petroleum industry, would bring quick approval for upward adjustments in crude-oil price schedules. The need for the advances has been covered in several reports made to the Office of Price Administration and those presenting the data at Washington have informed OPA officials that they are in a position to furnish any additional information desired.

CRUDE PRODUCTION *4,309,875 bbl. daily average—up 198,325 bbl. One year ago 3,603,165 bbl.*

CRUDE STOCKS *242,683,000 bbl. as of December 13—down 1,517,000 bbl. One year ago 261,293,000 bbl.*

GASOLINE STOCKS **89,297,000 bbl. as of December 20—up 1,875,000 bbl. One year ago 82,515,000 bbl.*

RESIDUAL FUEL-OIL STOCKS *95,560,000 bbl. as of December 20—down 202,000 bbl. One year ago 102,541,000 bbl.*

GAS OIL AND DISTILLATES *51,487,000 bbl. as of December 20—down 1,322,000 bbl. One year ago 44,366,000 bbl.*

REFINERY RUNS *4,070,000 bbl. daily week ended December 20 — up 73,000 bbl. One year ago 3,585,000 bbl.*

*Includes 7,408,000 bbl. aviation motor fuel, up 128,000 bbl. One year ago 6,340,000 bbl.

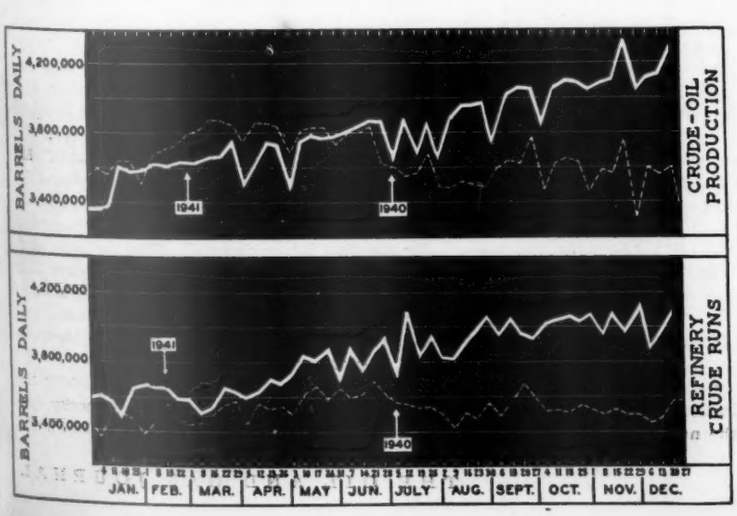
The accuracy of the information presented has not been questioned. The position of top officials of the Office of Petroleum Coordinator has been friendly to the increases and the need for certain adjustments in refinery markets has been recognized by that agency. The recent action of OPM in asking the Tariff Commission to conduct an investigation of crude prices is frankly termed by many operators a "buck-passing" development presumably designed to postpone final decisions for several additional weeks or months. It is pointed out that the Tariff Commission will not be able to secure cost data not now available to the price administrator. Among operators support is growing for a plan to have the Office of Petroleum Coordinator determine price levels during the war period. It is pointed out that OPC will bring about important revisions in the industry's operations to meet military and civilian requirements. These will mean added costs which will vary as to sections and divisions of the industry. It is felt that the government agency which is responsible for the changes and which will be most familiar with the costs involved should determine prices. Representatives of the industry are also bringing the oil situation to the attention of legislative committees which are considering pending price-control and general war-control bills. It is suggested that a parity between crude oil and petroleum products in relation to other commodities be established.

The situation is particularly important to operators who are unable to complete plans to carry on exploration operations until the price matter has been determined. Operators as a group realize the need for active wildcatting in order that new fields will be discovered to offset next year's record demands with new reserves. These operators are anxious to do their part but cannot justify the needed expenditures on the basis of present prices for crude oil.

The week brought several announcements out of Washington of major importance to the industry's operations. These are explained in succeeding pages of this issue.

### *DAILY AVERAGE PRODUCTION FOR WEEK*

| | Dec. 20, 1941 | Bur. Mines Dec. est. of demand | December state allowables | Dec. 13, 1941 |
|---|---|---|---|---|
| Arkansas | 73,695 | 76,500 | 76,300 | 73,590 |
| California | 652,125 | 635,800 | 613,200 | 665,250 |
| Eastern fields | 111,250 | 116,600 | ..... | 110,850 |
| Illinois | 383,545 | 426,500 | ..... | 384,195 |
| Kansas | 251,600 | 260,700 | 264,000 | 255,950 |
| Louisiana | 359,080 | 340,000 | 354,705 | 357,695 |
| *North Louisiana* | *82,230* | ..... | ..... | *81,695* |
| *Louisiana Gulf Coast* | *276,850* | ..... | ..... | *276,000* |
| Michigan | 52,620 | 52,300 | 60,000 | 56,890 |
| Mississippi | 70,055 | 60,300 | ..... | 75,535 |
| Nebraska | 5,175 | 6,100 | ..... | 5,200 |
| New Mexico | 118,550 | 116,100 | 117,000 | 118,580 |
| Oklahoma | 413,150 | 460,000 | 428,000 | 415,975 |
| Rocky Mountain states | 113,030 | 108,400 | ..... | 112,940 |
| Texas | 1,706,000 | 1,479,700 | 1,555,192 | 1,478,900 |
| *East Texas* | *440,700* | ..... | ..... | *369,250* |
| *West Texas* | *340,000* | ..... | ..... | *290,800* |
| *North Central Texas* | *140,350* | ..... | ..... | *139,100* |
| *East Central Texas* | *91,600* | ..... | ..... | *84,300* |
| *Texas Panhandle* | *98,650* | ..... | ..... | *87,800* |
| *Texas Gulf Coast* | *485,550* | ..... | ..... | *412,500* |
| *Southwest Texas* | *109,150* | ..... | ..... | *95,150* |
| Total United States | 4,309,875 | 4,139,000 | ..... | 4,111,550 |
| Total production, Jan. 1-Dec. 20, 1941 | | 1,353,535,275 bbl. | | |
| Same period last year | | 1,304,482,420 bbl. | | |



# OPC Given Full Authority To Control Well Spacing

By HENRY D. RALPH

WASHINGTON, D. C., Dec. 23.—The first step toward forced unitized operation of all oil and gas fields in the United States was taken today when the Office of Production Management, on the specific recommendation of the Office of the Petroleum Coordinator, issued General Preference Order M-68, providing for the easy acquisition of materials and supplies for drilling and production purposes for operators who conform to uniform spacing patterns which are set up by the OPC.

The new order not only denies priority assistance to any operator not conforming to well spacing and other restrictions laid down by Coordinator Ickes, but specifically prohibits any operator not following instructions from obtaining or attempting to obtain any materials for the production of petroleum. This part of the order reads:

"No operator shall order, purchase, accept delivery of, withdraw from inventory or in any other manner, directly or indirectly, secure or use material for the production of petroleum." In addition, it directs that "No person shall deliver or otherwise supply, or cause to be delivered or otherwise supplied, any material which he knows, or should know, is intended for use in the production of petroleum."

### Provisions Made for Exceptions

These provisions are subject only to certain limited exceptions, including the well-spacing provision. This provision will make readily available material for the drilling of new oil wells in all fields (other than condensate fields) where the particular wells conform to a uniform spacing pattern of not more than one single well to each 40 surface acres.

Similarly, Mr. Ickes said, materials will be reading available for new gas wells drilled in conformance with a uniform spacing pattern of not more than one single well to each 640 surface acres.

The revolutionary order, Mr. Ickes explained, was proposed so as to obtain the adoption of well-spacing practices that will both increase the ultimate recovery of oil and minimize the use of critical defense materials, such as steel, nonferrous metals and rubber.

Under one exception in the new order, individuals who desire to construct cycling plants, natural-gasoline plants, gas return, or pressure-maintenance plants, may file an application for such construction with the OPC. Also individuals or fields desiring a well-spacing pattern other than that imposed by the order, may file an application for such a pattern. The restrictions also do not apply in the following instances:

1. Material to be used for repair or maintenance purposes or as operating supplies.

2. To any case where material is used by an operator exclusively for operations directly involved in the search for and discovery of a previously unknown pool. This includes material necessary for prospecting and material used in drilling and completing exploratory wells.

3. To any case where material is to be used by an operator exclusively for carrying out investigations into more efficient methods of conducting production operations.

4. To any case where material is to be used by an operator engaged in secondary recovery operations by means of artificial water-drive, gas-drive or air-drive operations, but not including material to be used in production operations by means of primary gas cycling or pressure maintenance.

5. To any case where material necessary for lease equipment, including oil-treating equipment and salt-water disposal or injection equipment, but not including pumping and artificial lifting equipment, is to be used by an operator.

6. To any case where material is to be used for pumping or other artificial lifting equipment on any lease of over 10 acres on which the number of wells to which pumping equipment has been, or, is to be, attached does not exceed an average of one such well to every 10 surface acres; also to any case where material is to be used for pumping equipment on a lease of 10 acres or less, on which lease no other wells are located to which pumping equipment is attached.

7. To any case where the Priorities Division of OPM, upon recommendation of the OPC, has determined that production of petroleum by any operator is necessary and appropriate in the public interest and to promote national defense.

"Ample provision has been made for individualized treatment which will permit individual operators and individual fields to secure materials assuring a drilling and construction program commensurate with the maximum recovery of petroleum located in existing reserves," Mr. Ickes stated.

The exceptions contained in the order, he added, are designed to "protect so far as possible, the continued discovery and development of much-needed petroleum for the war effort."

Today's order will be followed immediately by a second order which will provide the actual means of procuring essential supplies for drilling and production purposes.

•

# Coordinator to Specify Crude Demand to States

WASHINGTON, D. C., Dec. 23.—A national proration plan, specifying daily production of petroleum for each producing state on a monthly basis, was issued today by Petroleum Coordinator Ickes.

Under the new plan, the Office of Petroleum Coordinator will issue monthly "recommended production rates" for each producing state. These rates will replace the monthly state forecasts of demand which have been issued up to this time by the Bureau of Mines. These states' forecasts will be abandoned, but the bureau will continue to make and issue a monthly national forecast of demand.

Monthly certificates will be issued to each state setting forth the recommended production rate for that state. These certificates will be based on a "careful, scientific and impartial investigation, collection and evaluation of all available pertinent data and the findings and recommendations of the Bureau of Mines."

The system was designed to insure a better balanced participation in the task of meeting the national demand for petroleum, Mr. Ickes declared. Imposition upon the oil industry of the heavy task of promptly meeting war needs for petroleum has made the shift to the new system essential, he added.

The first certificates under the new system were issued today. Telegrams were dispatched to each oil-producing state informing them of the recommended production rates. A complete statement announcing the new method has been sent to the oil regulatory body of each state. Where no regulatory body exists, as in Illinois, the governor of the state has been notified. In each case the rate is based upon a finding of fact that production at, but not greater than, such rate is essential in the national interest.

### First Certifications Issued

The recommended daily production rates for January, based on a Bureau of Mines forecast of 4,138,400 bbl. as the daily national requirement for the month, are as follows:

Texas, 1,573,500 bbl.; California, 646,200; Oklahoma 415,700; Illinois, 386,400; Louisiana, 329,300; Kansas, 259,900; New Mexico, 121,200; Wyoming, 78,600; Arkansas, 73,700; Mississippi, 60,400; Pennsylvania, 47,400; Michigan, 47,400; Montana, 21,500; Indiana, 17,300; New York, 15,000; Kentucky, 12,400; West Virginia, 12,000; Ohio, 9,000; Colorado, 5,900, and Nebraska, 5,600.

"One of the most urgent war demands," Mr. Ickes asserted, "is the demand for petroleum. Not only must immediate demands be met, but it is a military necessity that provision be made now for meeting future demands. The national emergency no longer permits the present haphazard participation in supplying the national demand for petroleum that has heretofore characterized the production of many of the oil-producing states and of many individual fields."

Action of the coordinator in establishing the new system was based upon the authority conferred by President Roosevelt in establishing the

Office of Petroleum Coordinator. In his letter creating the office, the president declared that one of the requirements of the defense program "which must be made the basis of our petroleum defense policy . . . is the development and utilization with maximum efficiency of our petroleum resources."

He added that one of the coordinator's major responsibilities in effectuating the defense petroleum policy would be "to make specific recommendations . . . to the appropriate . . . agency representing any state . . . as to action which is necessary or desirable . . . to insure the maintenance of a ready and adequate supply of petroleum and petroleum products."

Mr. Ickes pointed out that the new system should rectify situations where previously, acting on the basis of a forecast of demand issued by the Bureau of Mines, oil-producting states "had sometimes produced amounts of oil disproportionate to their ability to sustain such production."

This had the effect, he declared, of seriously depleting the resources of certain states at the cost of future ability to produce oil.

"A serious situation was created in Illinois, for example," he said, "where 38.5 per cent of the state's known reserves were extracted in 1940 alone." The recommended production rate for Illinois in January is a reduction of 40,100 bbl. a day as compared with the December Bureau of Mines forecast.

Mr. Ickes said that to avoid undue dislocation, in determining the proper participation of each state. "The principal weight will be given at first to the current demand for crude petroleum from each state, even if such demand has largely developed merely from the availability of petroleum and without regard to the ability of the state or area to maintain such a rate under conditions of efficient sustained production."

"As time goes on and old fields decline and new fields develop," he said, however, "increasing weight will be given to the ability of a state to maintain its rate of production of crude petroleum on an efficient and sustained basis."

•

# *Elkins-Case Decree Will Limit Pipe-Line Profits*

WASHINGTON, D. C., Dec. 23.—The Department of Justice today obtained a judgment under the Elkins Act against nearly all important interstate common-carrier petroleum and products pipe lines east of the Rocky Mountains, enjoining them from granting rebates against regular tariff charges and enjoining shipper-owners against receiving rebates or reductions for transportation of their property.

The department dropped test cases brought September 30, 1940, against Phillips Petroleum Co., Great Lakes Pipe Line Co. and Standard Oil Co. (Indiana) and filed new case in the District of Columbia federal court against 20 major oil companies, 7 subsidiaries and 52 pipe lines. Attorneys for defendants appeared before Justice David A. Pine this morning and consented to entry of final decree.

The judgment prohibits any pipe line from giving a shipper-owner earnings, dividends or other things of value in excess of 7 per cent of the owner's share of the pipe line's common-carrier property in any calendar year beginning January 1, 1942. If the line carried any property of that owner that year.

### Special Surplus Account

Net earnings in excess of permitted distribution are to be retained in a special surplus account which may be used for extending existing or constructing or acquiring new common-carrier facilities, for reasonable working capital requirements during the year, or for retiring debt outstanding as of today which was incurred and used in constructing common-carrier property. In case of dissolution or sale of a pipe line, retained surplus may be distributed to stockholders of corporation which owns pipe line at that time.

If the pipe line or shipper-owner violates this judgment, the government may obtain three times the sum involved in lieu of all other remedies or proceedings.

The judgment specifically states it does not limit right of any party in pending A.P.I. or other antitrust case to introduce evidence regarding pipe-line ownership or operation nor influence right of government to seek divorcement nor other kind of rearrangement of pipe-line ownership.

Each pipe line must report to the attorney general on April 15 each year on valuation, earnings, dividends, and other data covered by the judgment.

Judgment states it does not affect right of any pipe line under Cole Emergency Pipe-Line Act and president's proclamation thereunder.

The court retains jurisdiction and any parties may apply at any time for further orders or instructions, modification on any ground, or enforcement of compliance, but defendants shall not be liable to greater penalty than triple damages.

### All Common Carriers Covered

The judgment defines defendant common carrier as including each and every common carrier engaged in the business of transporting crude oil or gasoline or other petroleum products in interstate commerce by pipe line which is or may be named as a defendant in the complaint. It does not include natural-gas lines nor intrastate California lines but otherwise covers most important lines filing tariffs with the Interstate Commerce Commission, including pipe-line departments of major companies and all lines operated in such a manner that a shipper via it is entitled to a share of its earnings.

Shipper-owner means any named defendant or affiliate so related as to be controlled by a defendant, and all shipper-owners are forbidden to receive anything of value from a pipe line in excess of permitted earnings distribution.

The judgment covers most of the important pipe lines east of the Rockies. Among those not named are Ohio Oil Co., Illinois Pipe Line Co., Arkana Transit, and Rocky Mountain Pipe Line Co. Neither the department nor these companies made any comment on their failure to agree to this judgment, but presumably they risk future litigation.

Valuation used in figuring 7 per cent dividends is latest ICC final valuation or one made or brough up to date by ICC accounting methods. This may not include additions made out of impounded excess earnings funds. If the permitted 7 per cent is not earned in any 1 year it may be credited or paid during any one of the next 3 years in addition to payments permitted during each such subsequent year.

### Companies Sign Judgment

At the request of the companies the settlement was called a final judgment rather than a consent decree. Companies which signed are:

Atlantic Refining Co., Cities Service Co., Consolidated Oil Corp., Continental Oil Co., Gulf Oil Corp., Humble Oil & Refining Co., Mid-Continent Petroleum Corp., Phillips Petroleum Co., Pure Oil Co., Shell Union Oil Corp., Skelly Oil Co., Socony-Vacuum Oil Co., Inc., Standard Oil Co. (Indiana), Standard Oil Co. (Kentucky), Standard Oil Co. (New Jersey), Standard Oil Co. (Ohio), Sun Oil Co., Texas Co., Texas Corp., Tide Water Associated Oil Co., Ajax Pipe Line Corp., Arkansas Fuel Oil Co., Arkansas Natural Gas Corp., Arkansas Pipe Line Corp., Atlantic Pipe Line Co., Buffalo Pipe Line Corp., Carter Oil Co., Cities Service Oil Co. (Del.), Continental Pipe Line Co., Detroit Southern Pipe Line Co., Empire Gas & Fuel Co., Empire Pipe Line Co., Great Lakes Pipe Line Co., Gulf Refining Co., Humble Pipe Line Co., International Pipe Line Co., Kaw Pipe Line Co., Keystone Pipe Line Co., Lawrence Pipe Line Co., Magnolia Petroleum Co., Magnolia Pipe Line Co., Magnolia Pipe Line Co. of Illinois, Middlesex Pipe Line Co., Oklahoma Pipe Line Co., Pan American Petroleum & Transport Co., Pan American Pipe Line Co., Phillips Pipe Line Co., Plantation Pipe Line Co., Portland Pipe Line Co., Pure Oil Pipe Line Co. (Pa), Pure Transportation Co., Shell Pipe Line Corp., Sinclair Refining Co., Sohio Pipe Line Co., Southeastern Pipe Line Co., Standard Oil Co. of Louisiana, Standard Oil Co. of New Jersey, Standish Pipe Line Co., Stanolind Pipe Line Co., Sun Oil Line Co., Sun Oil Line Co. of Michigan; Sun Pipe Line Co., Sun Pipe Line Co. of Illinois, Sun Pipe Line, Inc., Sun Transportation Co., Susquehanna Pipe Line Co., Texas-Empire Pipe Line Co., Texas-Empire Pipe Line Co. of Texas, Texas-New Mexico Pipe Line Co., Texas Pipe Line Co., Tide-water Pipe Co., Ltd., Tidal Pipe Line Co., Toledo Northern Pipe Line Co., Transit & Storage Co., Tuscarora Oil Co., Ltd., United States Pipe Line Co., Utah Oil Refining Co., Wabash Pipe Line Co., and White Eagle Pipe Line Co.


## INTERNATIONAL ISSUE FEATURES

- **Summary of world developments and operations start on Page 69.**
- **The Spanish-English Section, describing the newest operating practices in all branches of the industry, starts on Page 170.**
- **Color maps evaluating oil-productive possibilities of the world's land mass with foreword start on Page 81.**

*THIS ISN'T NECESSARILY INTENDED TO FOOL THE JAPS, ALTHOUGH CAMOUFLAGING WEST COAST OIL PROPERTIES IS TIMELY. A CALIFORNIA OPERATOR DECORATED A DERRICK WITH EVERGREEN, MOUNTED SANTA, HIS SLEIGH AND REINDEER ON PUMPING JACKS. WITH APPROPRIATE LIGHTING AND MOTION OF THE JACKS HE MANAGED A PICTURESQUE CHRISTMAS DISPLAY.*

# This Week...

**Industry heard a plea from OPM asking that all junk steel be directed back into the manufacturing stream. Consensus is that the industry has little "junk" on hand. Energetic oil men serving in prewar times on Steel-for-Britain committees saw to that.**

●

**Pipe-line company defendants in the so-called Elkins Act cases consented Tuesday to a decree limiting shipper-owners to dividends or earnings not exceeding 7 per cent of the owners' share of the common carrier property.**

●

**Sweeping control of drilling operations and a commanding voice in handling new production was passed this week to the Office of Petroleum Coordinator. OPC authority is relayed from the Office of Production Management which issued its Preference Rating Order M-68 prohibiting operators from acquiring materials for drilling oil wells on less than 40 acres and gas wells on less than 640 acres. Materials for exploration will be freely available.**

●

**The Interstate Oil Compact Commission created a five-man executive committee which will meet monthly and appoint a research and coordinating committee to make investigations and pool information of the oil states concerned with operating practices.**

●

**First recommendation issued by OPC on state producing rates. Coordinator to certify monthly totals to all states in future, will use sustained producing ability as one of the yardsticks.**

●

**OPC launches search in this country for inactive refineries of 10,000 bbl. per day capacity, or more, that may be purchased, dismantled, shipped to the interior of the U.S.S.R., reassembled and placed in operation. Only six out of nearly 90 idle U. S. plants qualify, all others are below the specified capacity.**

●

**Turnkey drilling contracts suffered a blow. Such work, so the Internal Revenue Bureau ruled, must be considered a capital investment. Footage-contract expenses may be deducted as intangibles in reporting income.**

●

**Refiners on both coasts are experimenting with blackouts, new protective organizations are springing up daily in the industry's producing centers to guard against sabotage. A keen awareness of the industry's vital role in war is evident and it is taking no chances on disruption of functions. Exodus of oil from the Pacific Coast to safer points was reported but where it could be put and how it could be moved very far inland no one knew.**

●

**Changes in the new priority order covering repair and maintenance materials, issued as Order P-100 last week to replace P-22 which is now revoked, are largely technical. Liberalization and clarification were the OPM's objectives.**

●

**Submarine attacks on several tankers near the California coast and reports that enemy pig boats are operating near the Atlantic seacoast revived discussions of pipe-line projects that would relieve dependence on marine traffic. Mentioned in Washington in revived discussions are the national-defense line, the Ohio-Pennsylvania link that would increase deliveries from Middle West pipe-line systems to the eastern network and northern extension of the Plantation products line from North Carolina to vicinity of Norfolk, Va.**

●

**Patent owners reduced royalties 50 per cent on processes for producing aviation-gasoline base stocks for or at the request of the Government, will make another cut July 1, 1943.**

●

**Another $5,000,000 was stacked on the total industry and Government are spending for plants to produce aviation gasoline or its components. Cities Service will build a $2,000,000 plant at East Chicago, Ill.; Humble and Stanolind a $3,000,000 recycling installation in the Katy field, Waller County, Texas.**

# New Order Clarifies Repair And Maintenance Purchases

A NEW preference rating order covering repair and maintenance equipment for the petroleum industry became effective December 18. The new order, numbered P-100, takes the place of the old repair and maintenance order, P-22, which is revoked.

Differences between P-100 and P-22 are largely technical. However, some provisions of the old plan have been liberalized and a number of clarifications have been made in order to eliminate misunderstandings and misapplications of the order which occurred in the past.

Deleted from P-100 is the provision in the old P-22 that the rating of A-10 shall not be applied unless the material can not be obtained without its use.

The former restriction on acceptance of material for inventory of maintenance, repair, or operating supplies by producers using the order has been changed to permit inventory and stores not exceeding 110 per cent of the maximum dollar volume of such materials purchased during the corresponding calendar quarter of 1940. The previous figure was 100 per cent. This change was made to allow for price increases. However, the order now specifically states that no materials may be accepted for additions to inventories and stores of maintenance, repair, and operating supplies until such inventories have been reduced to a practicable working minimum.

Prohibited still is the purchase of materials under the order for expansion or betterment of property or equipment. Operating capacities and improvements may be handled through Form PD-1 which should be also used to obtain items that are capitalized and carried on the consumer's books as a fixed asset.

Organizations performing services for oil companies have been specifically included in the new order, Section B-3 of which reads: "Any person using tools or equipment to repair or maintain the property of any producer as defined."

The above permits welding shops, blacksmith shops, small machine repair shops, and other persons whose business is primarily a repair function to use this order to keep in working order their own establishments. It also permits such persons to procure the necessary tools and other items consumed in the course of their repair business.

A supplier who does not physically alter parts which he supplies to another is permitted to group several orders together so as to purchase in a minimum commercial quantity.

●

## Carbon-Black Manufacturers Authorized to Raise Prices

Producers of carbon black are being permitted to raise prices by slightly less than 5 per cent above present levels on deliveries made beginning January 1, 1942, Leon Henderson, price administrator, announced last week. Higher costs and reduced revenue from export sales were responsible.

Carbon black is produced from natural gas by 3 large and 14 smaller companies. Approximately 85 per cent of the output is used by the rubber industry in the production of automobile tires. The balance is used largely in the manufacture of ink, paints and plastics.

Prices on standard domestic grades which may be charged beginning January 1 are as follows: Ordinary carbon black in bulk, 3.30 cents per pound; carbon black in bags, compressed or dustless, 3.55 cents per pound; carbon black in light bags, suitable for ink or paint, 3.625 cents per pound.

# Base Stock for 100-Octane Is Available From Many Sources

By W. L. NELSON

THE need for high-octane-number fuel for Allied planes is brought clearly to the front by United States participation in hostilities. The need may not be greater now than it was before the declaration of war, but certainly the desire quickly to terminate the affair has been strengthened. Before hostilities, the Office of the Petroleum Coordinator estimated that a capacity of 126,000 bbl. per day of 100-octane fuel was necessary before the end of 1942, but under present conditions joint forces may utilize larger amounts, perhaps even 180,000 bbl. per day. Regardless of the precise magnitude of the demand, it will be large enough to warrant the immediate attention of the refining industry. One hundred and eighty thousand barrels per day is a quantity roughly equal to the quantity of premium-grade motor fuel that has been heretofore manufactured.

Plans have been formulated so rapidly that the exact number and capacity of the plants already under construction or operation by arrangements of the OPM cannot be stated but about 28 plants have been mentioned. Of these, 1 is for the separation of straightrun base stock, 4 are for the separation of isopentane, 3 are special or catalytic cracking plants, 5 are for finished 100-octane fuel, and 10 are types whose function has not been stated. The production of all 100-octane fuel is now about 50,000 bbl. per day.

Inasmuch as some of the processes for manufacturing synthetic rubber require the same hydrocarbons (primarily butylene and isobutylene) as those used for aviation fuel, it might be well at this stage to consider a refinery capacity that would care for both aviation gasoline and synthetic rubber.

*Fuels are a blend.*—In order to obtain the necessary combination of properties such as chemical stability, maximum octane number, and high volatility without a high vapor pressure, it has been necessary to blend several types of stocks. In general these components are:

1. Bulk base stock of straightrun naphtha.
2. Isopentane base stock of high volatility and octane number.
3. Various high-octane alkylates, etc.
4. Tetraethyl lead.

The general relationships between the finished 100-octane aviation gasoline, the blending stocks just enumerated, and the crude oil or natural gas from which the blending stocks are derived, are indicated in Fig. 1.

The fundamental sources of aviation fuels are obviously crude oil and natural gas or gasoline. Natural gas contains butane, isobutane, and small amounts of isopentane. Crude oil, refinery gases, and cracked gases also contain these hydrocarbons. The general properties of these hydrocarbons as well as other materials involved in the manufacture of 100-octane aviation fuels are indicated in Table 1. Butane and isobutane are four-carbon-atom paraffin hydrocarbons which boil at 31° and 13.5° F., and hence they are gases at normal conditions but are readily dissolved by gasoline or other petroleum liquids. Isopentane is the next higher boiling hydrocarbon (82° F.) and although it is a liquid it exerts a vapor pressure of about 20 lb. per sq. in. at 100° F. as compared with a 7-lb. vapor pressure for finished 100-octane gasoline. In general the branched-chain isoparaffin hydrocarbons such as isobutante and isopentane are more valuable than the corresponding straight-chain paraffin hydrocarbons (butane and pentane) because the isoparaffins produce final gasolines, alkylates, etc., that have high octane numbers. Thus, the isomerization operation indicated in Fig. 1 is important because it is the process by which butane is converted into isobutane.

**TABLE 1—SOME CHARACTERISTICS OF AVIATION-GASOLINE STOCKS**

| Material— | Formula | Boiling point °F. | Octane number | Use— |
|---|---|---|---|---|
| Isobutane | $C_4H_{10}$ | 13.5 | .... | Alkylated or decomposed into isobutene |
| Isobutene (isobutylene) | $C_4H_8$ | 20.0 | .... | Alkylated or polymerized and hydrogenated |
| Butane | $C_4H_{10}$ | 31.0 | .... | Alkylated, decomposed into butene or isomerized to isobutane |
| Butene (butylene) | $C_4H_8$ | 21.0 | .... | Alkylated or polymerized and hydrogenated |
| Isopentane | $C_5H_{12}$ | 82.0 | 90 | Direct blending stock |
| Benzene | $C_6H_6$ | 176.0 | 97 | Direct blending stock |
| Straightrun naphtha | .... | .... | 65-80 | Direct blending stock |
| Catalytic gasoline | .... | .... | 76-82 | Direct blending stock |
| Alkylate gasoline | .... | .... | 75-88 | Direct blending stock |
| Hydrogenated polymers | .... | .... | 80-95 | Direct blending stock |

## Straightrun Naphthas

Crude oil is also processed by topping for the separation of straightrun-blending naphtha and for cracking or reforming stocks which are charged to catalytic-cracking plants. The straightrun-blending naphtha is cut to a low end point so that the octane number will be relatively high and in order to gain volatility. The naphtha from certain crude oils is higher in octane number than others, notably those from naphthenic (or asphaltic) base crude oils, and hence such crude oils are particularly valuable in this emergency. Unfortunately, many of the crude oils are high in sulfur and hence the number of highly suitable crude oils for the manufacture of straightrun-base stocks is further curtailed. Comprehensive surveys of crude oils for this purpose are not at this moment available but the following are a few well-known crude oils of the Texas Gulf Coast area which contain low-end-point naphtha having an octane number exceeding 75: Duck Bay, Mount Lucas, Oakville, Hitchcock, Raccoon Bend, Albercas, Alta Mesa, Baldwin, Conoco, Driscoll, Killam, Oilton, Piedre Lumbre, Richard King, Rincon, Riverside, Sam Fordyce, Saxet, Taft, and Turkey Creek. However, it is not necessary to have exceedingly high octane-number naphthas because the lower-octane naphthas usually have a good lead susceptibility and hence their deficiency in octane number is rapidly overcome by the addition of lead. Sulfur also greatly reduces the lead susceptibility and hence a low sulfur somewhat low-octane stock may be superior to a high-octane higher sulfur stock.

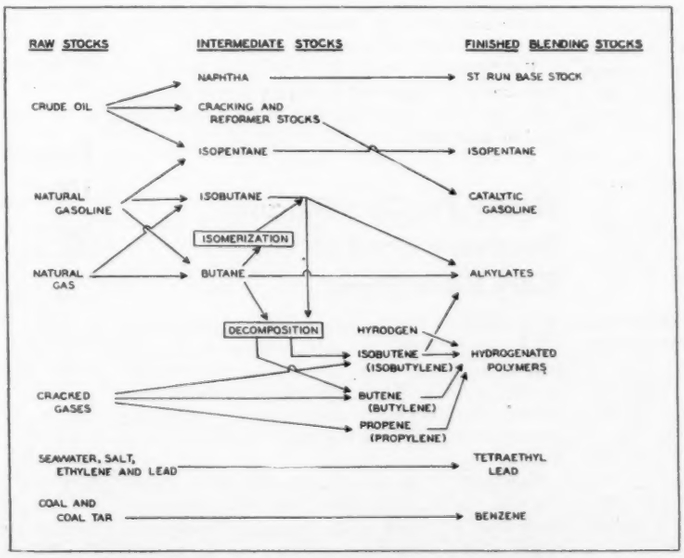



*Fig. 1—Simplified diagram showing raw stocks, intermediate hydrocarbons and the end components which are adaptable to production of 100-octane gasoline*

The general specifications of high-octane fuels shown in Table 2, particularly the low-gum and sulfur contents indicate clearly that ordinary cracked gasolines and polymer gasolines are not satisfactory for 100-octane aviation fuel. Both of these types of gasolines are high in gum content. The gum and sulfur can be removed to some extent by chemical treatment but in so doing, the octane number is decreased sharply. Thus, cracked and polymer gasoline must be treated much more vigorously than generally practiced, if they are to be lowered to sulfur contents of 0.05 per cent and gum contents less than 5 mg. by the copper-dish method. The use of some inhibitor (1 lb. per 5,000 gal.) helps to some extent in stabilizing the gum but the difficulties encountered in treatment are still great.

Isopentane, straightrun naphtha,

benzene, and tetraethyl lead are used directly as blending stocks but high-octane blending stocks, such as alkylates, hydrogenated polymers, and catalytic gasolines are produced by special processes. The catalytic gasolines are produced from regular cracking-plant charge stocks such as light gas oil or reforming naphthas and, therefore, the preparation of these charge stocks presents no difficulty to refiners. The other high-octane blending stocks are, however, manufactured to a large extent from isobutane, isobutene (isobutylene), and butene (butylene). Isobutane is available in large amounts that are adequate but the percentage that is present in natural gas or gasoline is very small and, consequently, the cooperation of a large number of natural-gasoline plants will be necessary. The olefin hydrocarbons, butene, and isobutene, are found in cracking-still gas in small amounts and they can be recovered, along with isobutane and butane, by gas-recovery systems in refineries. This source is not, however, large enough or perhaps it is better to say that these hydrocarbons can be produced more easily by the thermal decomposition (or cracking) of butane or isobutane.

**TABLE 2—APPROXIMATE SPECIFICATIONS FOR 100-OCTANE AIRCRAFT FUEL**

| | |
|---|---|
| Color | blue |
| Octane No.* min. | 100 |
| Sulfur, max. | 0.05% |
| Corrosion and residue (copper dish) | 5 mg. max. residue and no discoloration |
| Gum (modified government method) | 6 mg. |
| Lead fluid, max. | 4 ml. |
| A.S.T.M. distillation: | |
| 10% max. | 167° F. |
| 50% max. | 212° F. |
| 90% max. | 275° F. |
| Residue, max. | 1.5% |
| Loss, max. | 1.5% |
| Vapor pressure, Reid, max. | 7 lb. |
| Freezing point, max. | —76° F. |
| Inhibitor, max. for 5,000 gal. | 1 lb. |

*By a government modification of the A.S.T.M. Method D-357-40.

**This analysis of raw materials from which and processes by which 100-octane-gasoline base stocks may be produced is presented to clarify the technical terms and methods available to the industry in meeting the demand for tripling the output of fighting-grade motor fuel.**

**Recent order of the OPC permits refiners to pool their facilities for transportation, storage and processing in order to accumulate and exchange stocks in any manner that will enhance the objective of greater production.**

**It is conceivable that every cracking-plant operator may be asked to accumulate butylene and isobutylene and every refiner or natural-gasoline operator may need to accumulate butane and isobutane. These may become the quickest ways to produce all the 100-octane fuel and synthetic rubber required by military forces and civilian consumers.**

### 100-Octane Plants

Many kinds of plants for producing high-octane blending stocks are available, and hence only a brief discussion of each can be given.

*Houdry catalytic cracking.*—In this process a low-boiling gas oil or a reforming naphtha is heated to about 850° F. and exposed to the action of a catalyst. In a once-through operation relatively large yields of 80-octane-number gasoline is produced. The gasoline is usually extremely low in sulfur and gum content. Large plants can be best used because of the elaborate equipment required in utilizing and regenerating the catalyst.

*Hydroforming and polyforming.*—In this process, reforming naphtha is cracked or reformed in contact with a catalyst and in the presence of a recycling stream of hydrogen. Much the same type of gasoline is obtained as by the Houdry process except that hydroformed gasoline is rich in aromatic hydrocarbons. In polyforming, propane or the butanes are used instead of hydrogen and octane numbers of about 88 are possible.

*Alkylation.*—In these processes (thermal or catalytic) a paraffin hydrocarbon such as isobutane is combined with an olefin hydrocarbon such as isobutene. This may be accomplished by heat and pressure as in the thermal process or by a catalyst such as sulfuric acid. The product consists of stable paraffin (or isoparaffin) hydrocarbons which have a good lead susceptibility and high-octane number and the material contains very little sulfur.

*Isooctane or Hydrocodimer processes.*—In these processes two olefin hydrocarbons such as isobutene and propene (or 2 mol. of one kind of hydrocarbon) are hooked together by catalytic or thermal polymerization. This results in a somewhat unstable olefin type of product containing some gum and having less desirable lead susceptibility. The product is, therefore, hydrogenated (after sulfur removal) to a fully hydrogen-saturated product which is extremely stable, low in sulfur, susceptible to lead, and having a high-octane number if branched-chain hydrocarbons are used as the original charge stock. The final product is generally similar to the alkylates mentioned above except that higher octane numbers can be obtained if suitable hydrocarbons are available as the charge stock.

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# Refining Industry Guarantees Supply of 100-Octane Gasoline to Government

WASHINGTON, D. C., Dec. 23.—The refining industry has joined with the engineers of the OPC in mapping out a tentative program of refinery construction which will assure the plant capacity to produce 150,000 bbl. of 100-octane aviation gasoline daily by July 1, 1943.

The plan provides for concentrating the production of this fuel within relatively few plants located in scattered major refining areas. However, each plant will be supplied with charging stock and blending materials from many surrounding sources.

To promote this plan the engineers in the industry and in the several agencies of the Government have tried to consider all factors and have weighed the advantages of large installations which take less metal per unit of output against the smaller units which might be scattered among a greater number of states.

The financial justification of these plants has also been provided. In doing this the Government has encouraged all refiners of average size or larger to submit proposals with the understanding that the Government would finance all or any part of a satisfactory construction program to make this fuel and would agree to buy the output of the respective plant for a period of 3 years and at a calculated price which would allow the refiner to write off the investment at the end of that time.

Included in the price computation are the factors of obsolescence and plant depreciation. A sample calculation sets up 23⅓ per cent as a typical factor of obsolescence and 10 per cent against depreciation. These two when combined will thus equal the investment in the 3-year period and only the operating expenses need be defrayed out of the remainder of the calculated price paid by the Government for the products.

Provisions are made for continuing the manufacture of the material beyond the 3-year period with option for abandonment of the plant at the end of that time.

## Eighty Per Cent Butane Recovery Goal of Katy Field Plant

MAXIMUM economical recovery of isobutanes and butanes, valuable components in the production of 100-octane gasoline, is the chief objective in revised specifications for the world's largest recycling plant scheduled for immediate construction in the Katy field, Waller County, Texas.

Stanolind Oil & Gas Co., Humble Oil & Refining Co., and Humble Pipe Line Co. will invest more than $3,000,000 in the project. A preference rating of A-1-a has been assigned to the project to insure prompt construction. The plant will process 274,000,000 cu. ft. of gas daily, an amount which will yield nearly 7,500 bbl. per day of combined distillate, kerosene, naphtha, natural gasoline, butane, and isobutane.

Besides the plant proper, the A-1-a rating covers material and equipment for the drilling of eight additional gas wells and for the construction of 46 miles of 4-in. gasoline pipe line.

Original plans for the Katy recycling plant which have been under consideration for several months, provided for recovery of only 50 per cent of the butane and isobutane content of the distillate. The revised design, for which the high preference rating was obtained, is expected to recover 80 per cent of the butanes.

## Patent Fees Cut On 100-Octane Plants

WASHINGTON, D. C., Dec. 22.—A reduction of 50 per cent in the royalties for use of patents in making 100-octane aviation gasoline has been agreed upon by the five principal patent owners involved, according to the Office of Petroleum Coordinator.

The royalty, now 42 cents per barrel, will be reduced to 21 cents until July 1, 1943, and after that to 15 cents, on all 100-octane gasoline produced for or at the request of the Government. OPC estimates this will save the taxpayers some $5,000,000 per year.

Companies cooperating in the agreement are Texaco Development Corp., Shell Development Co., Standard Oil Development Co., Anglo-Iranian Oil Co., and Universal Oil Products Co.

# Government Negotiates Contract With Cities Service for $2,000,000 Plant

A MODEL contract for construction of a new 100-octane aviation-gasoline plant, calling for immediate start on a $2,000,000 installation at East Chicago, Ind., was consummated last week by representatives of the Cities Service Co., the Defense Supplies Corp., and the Office of Petroleum Coordinator.

The Cities Service-Government arrangement, the OPC declared, is expected to pilot the way for completion of similar aviation-gasoline contracts with several other refiners who will join the program for expanding production.

Under the provisions of the contract a loan will be advanced by the Government for part of the construction costs. The entire output will be purchased by the Government for at least 3 years. Also contributing importantly to the expansion program was a recommendation by the internal revenue commissioner, permitting liberal depreciation for income tax during the life of the contract.

The importance of the agreement, worked out in consultation with the coordinator, is that it makes it possible for refiners to undertake the large investments with assurance of a market for a sufficient period of a product now chiefly used in war. Perfection of contracts to enable American refiners to swing into production of the aviation fuel has been pushed by the OPC. Consummation of the Cities Service contract opens the way to immediate execution of additional contracts by other concerns who are in a position to enter the business.

Plant expansions costing up to $150,000,000 are either already under construction or ready for a start in the immediate future.

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# Cole Stresses Need for Defense Lines

THE need for pipe lines to free tankers for service in the Pacific war zone was emphasized by Rep. William P. Cole, Jr., at the dedication of Southeastern Pipe Line Co.'s 456-mile gasoline line constructed between Port St. Joe, Fla., and Chattanooga, Tenn.

Ceremonies for opening of the system, owned jointly by Gulf Oil Corp. and Pure Oil Co., were held at Chattahoochee terminal December 19.

While calling attention to the significance of the Southeastern system in the war program, Representative Cole expressed regret that steps had not been taken to provide the North Atlantic seaboard with national-defense pipe-line facilities.

"I am not satisfied," he declared, "that the recent effort to construct additional pipe lines for transportation of crude oil and gasoline to the East, insincere as some associated with such proposals were, should have been rejected. I see ahead with such certainty that I am willing to speculate upon the early use in the Pacific of tankers moved from the Atlantic service in numbers greater than those recently returned by the British, thereby presenting a condition similar to that of a few months ago, and showing a real demand for additional transportation facilities to the eastern part of the United States. Unfortunate as it may be that this situation was not improved in other ways than to impose the heavy additional burden on already strained railroad systems, I express the hope that the blessings we derive from this occasion, might serve as an immediate impetus to others, so that an underground-transportation supply of petroleum to the greatest eastern part of the United States will be an actuality before it is too late."

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## Demolition of Sarawak Fields Emphasizes U. S. Supply Role

UNITED States oil producers this week came face to face with what many production statisticians had been discussing for months—the loss of oil production now available to the Allied powers from fields in far corners of the earth, production that would most likely be replaced from the well protected oil fields of continental United States. It immediately became apparent that estimates of a daily demand for 5 million barrels a day production in the United States was far from fantastic.

Last week, for the first time in the present conflict, major producing properties were destroyed before they fell into the hands of the enemy. They were the Miri and Seria oil fields in Sarawak on the northwest coast of Borneo, on the East Indian Archipelago, which since 1910, had produced some 100,000,000 bbl. of oil from about 450 wells.

How the installations were wiped out was, of course, a military secret. It was generally assumed, however, that each of the 450 wells (ranging from 130 ft. to 5,000 ft. in depth), had been mined effectively so that production could not be resumed without redrilling. In addition, the British Far Eastern Command reported specifically that the refinery at Miri had been destroyed.

## Inactive Refineries Sought For Transfer to the U.S.S.R.

SEARCH for idle refineries in the United States preferably plants with capacity of 10,000 bbl. per day or more and in reasonably sound condition was launched this week by the Office of Petroleum Coordinator. Equipment qualifying and providing owners are willing to sell will be dismantled and shipped to the interior of the U.S.S.R. where it will be reassembled and placed in operation.

Out of 100 inactive refineries in the United States and Canada having combined capacity of 297,440 bbl. daily there are less than a dozen with crude capacity of 8,000 bbl. per day or more. Only six plants qualify under literal interpretation of the OPC request, consisting of three in California, one in Louisiana and two in Texas.

## Judgment Reversed In Pan-American Litigation

NEW YORK, Dec. 18.—Judgment for $200,000,000 and other relief granted Jacob Blaustein et al in an accounting suit against six directors of Pan-American Petroleum and Transport Co. and Standard Oil Co. of Indiana was reversed last week in the appellate division of the New York Supreme Court and the complaint ordered dismissed.

Plaintiffs alleged that Standard of Indiana, majority stockholder in Pan-American with 78.64 per cent of the shares, through its nominees on the Pan-American board, dominated the claimed fiduciary duties, exploited Pan-American's corporate opportunities for the parent company's profit.

Defendants in the suit were Pan American and Standard of Indiana and Edward G. Seubert, Charles J. Barkdull, Louis L. Stephens, Emmett G. McKeever, James A. Carroll, Jr., and Robert E. Wilson, all Pan-American directors and officers of the two companies.

## California Moves to Protect Industry Against Saboteurs

THE California oil industry this week had completed a concerted industry movement to prevent subversive activities and eliminate sabotage of properties and facilities. All fields are under heavy guard and every effort has been made to organize brigades and policing details.

Guards and night watches were installed within a few hours after the initial news of the bombing of Hawaii. This policing is in addition to military lines established and was done by employes of oil companies and individual operators. Wilmington and Long Beach were under guard within a few hours after the bombing. It is not likely that any successful sabotage work can be now effected in any California oil field due to prompt protective measures undertaken. Centralization and synchronization of activities is being done under the supervision of A. C. Rubel, vice president of Union Oil Co., and his assistants.

## Rhea Named Chairman East Texas A. I. M. E.

A S. Rhea, engineer, Sun Oil Co., Kilgore, Tex., has been elected 1942 chairman of the East Texas section of the American Institute of Mining and Metallurgical Engineers. Mr. Rhea is a graduate petroleum engineer from University of Texas. Other officers who will serve with Mr. Rhea are: M. L. Mayfield, Operators Committee, Cotton Valley, La., and C. B. Carpenter, U. S. Bureau of Mines, Dallas Tex., vice-chairmen; Curtis F. Maxwell, Humble Oil and Refining Co., Overton, Tex., secretary-treasurer; E. H. Blum, Atlantic Refining Co., Dallas, Tex., W. S. Morris, East Texas Engineering Association, Kilgore, Tex., and E. L. Rawlins, Union Producing Co., Shreveport, La., members of the board of directors for 2 years.

*A. S. RHEA*

## Tankers Ordered to Ports

LOS ANGELES, Calif., Dec. 23.—Following attacks on three tankers in coastal waters by enemy submarines, all tankers have been ordered to return to ports until further orders. The Union Oil Co.'s "Montebello," Standard Oil Co. of California's "H. M. Storey" and the "Larry Doheny" were fired upon but so far as known were not seriously damaged. A number of tankers are engaged in the transportation of refined products from local refineries to Washington and Oregon and other coastal points.

# Compact Plans for Major Role in War's Prosecution

By C. O. WILLSON

OKLAHOMA CITY, Okla., Dec. 20.—The Interstate Oil Compact Commission which met here today and yesterday made preparations to play a major part in gearing petroleum operations to the needs of a world-wide war. Its 2-day meeting was confined to business sessions and committee conferences at which plans for 1942 activities were discussed and formulated. At the final session today reports of committees were approved resulting in the adoption of the most comprehensive and active program in the 6-year history of the compact which now has 11 members among the oil states.

Gov. Leon C. Philips, who had insisted that his duties as chairman end with this meeting, was persuaded to accept a third term at the unanimous request of other members of the commission. Other officers reelected were: Andrew F. Schoeppel, State Corporation Commission of Kansas, first vice chairman; P. J. Hoffmaster, Conservation Department of Michigan, second vice chairman, and Charles L. Orr, secretary, in charge of the Oklahoma City headquarters.

### Changes in Operating Plans

Some of the changes made in the operating plans for next year are the result of recommendations of committees made at previous meetings. The necessity of quickly making effective a program which Governor Phillips said "is based on democratic processes" was also stressed by leaders of oil associations who spoke extemporaneously at the first general session Friday. The speakers included Frank Buttram and Col. Harold B. Fell, president and executive vice president, respectively, of the Independent Petroleum Association of America; Burdette Blue, newly elected president of the Oklahoma and Kansas division of the Mid-Continent Oil and Gas Association, and Col. E. O. Thompson, chairman of the Texas Railroad Commission and for several years an active member of the Oil Compact Commission, representing Texas.

To facilitate the work of the commission a five-man executive committee was appointed which will meet monthly. The committee consists of the chairman and first vice chairman; Hiram M Dow, representing New Mexico; J. C. Hunter of Texas and J. H. Alphin of Arkansas. Their activities will be subject to the final approval of the entire Compact Commission which will continue to meet quarterly.

It was announced that through the action of the state legislatures and state commissions the Compact Commission has the following funds available for the coming year: Texas, $20,000; Oklahoma, $15,000; Kansas, $3,000; New Mexico, $1,000; Arkansas, $1,000 and Colorado, $250. Additional funds may come later from other states. In the past the financial support for the commission has been confined to Oklahoma. The substantial increase in revenue will make possible an enlarged staff and permit the commission to carry on activities not possible in the past. No final decisions were made as to the staff at this meeting except for the reelection of Mr. Orr as secretary.

Considerable importance attaches to the appointment of the new research and coordinating committee consisting of eight members representing eight states. The members, who were selected from the technical staffs of the state conservation bodies or associated organizations, include: H. W. Bell, Louisiana Department of Minerals, chairman; F. V. L. Patten, chief supervisor, Oil and Gas Division, Texas Railroad Commission; John M. Kelly, New Mexico Conservation Committee; L. B. Taylor, petroleum engineer, conservation division, Kansas Corporation Commission; Dan O. Howard, petroleum engineer, Oklahoma Corporation Commission; F. R. Frye, petroleum engineer, Department of Conservation, Michigan; Dr. F. M. Van Tuyl, head of the department of petroleum engineering, Colorado School of Mines, and A. M. Crowell, director, Arkansas Oil and Gas Commission. Representatives of other member states will be selected later.

The duties of the committee as outlined in the resolution creating it, are far-reaching and are designed to give the Compact Commission, the war program at Washington and the petroleum industry the combined technical experience of the oil states in matters pertaining to operating practices.

The new committee met during the 2 days and agreed upon its activities which call for the exchange of information among members based on data which are now being collected by the various state conservation agencies. This information is to include: Bottom-hole pressure, gas-oil ratios, water production, production history of the fields, determination of type of drive in fields, completion practices including advisability of permitting dual completions, recoverable reserves and their availability, and types of crude produced.

This committee recommended the employment of a qualified engineer whose office would serve as a clearing house for the information prepared by the members of the committee and which would make available to the industry the collective findings which have a direct bearing on the compact's plan to give maximum cooperation to the Government.

### Fair Prices

Taking cognizance of the fact that the oil industry's markets are no longer determined by conditions in supply and demand but are now controlled by a war agency of the federal Government, the commission adopted the recommendations of the resolution committee which asked for "fair and compensatory" prices for crude oil and products. The resolution stated: "Under normal conditions sufficient reserves could be provided by new exploration without government control over prices, but since in the present emergency normal operations of supply and demand and competitive enterprise have been supplanted by government price control, we recommend to the agencies which now or hereafter may be vested with jurisdiction over prices, to determine prices during this emergency that will be fair and compensatory and insure the ability of private enterprise to discover new reserves, to efficiently develop and produce without waste, both through primary and secondary recovery methods, and prevent the premature abandonment of wells of small and settled production.

"We further recognize the importance of not being forced by the necessity of meeting unusual wartime demands, to produce existing wells at rates of production that would result in underground waste and a decrease in the ultimate recoveries, and this can be prevented only by the discovery of new reserves, which can best be stimulated and assured by compensatory price. It is also necessary that the material, supplies and equipment required to drill and complete new wells be made available if the demands for crude oil are to be adequately met without waste."

### Six Objectives

The six principal objectives of the commission in cooperation with the state regulatory bodies of the oil-producing states will be to:

1. Meet current and future emergency demands with the least possible waste.
2. Encourage the drilling of sufficient properly spaced wells to meet wartime needs.
3. Regulate the operation of all wells to conserve reservoir pressure and insure the greatest practicable ultimate recovery at the lowest possible cost with the minimum expenditure of artificial energy to effect production.
4. Encourage exploration so as to maintain reserves that will enable the industry to produce without waste any expanded demands that the emergency may require.
5. Maintain adequate stocks of crude oil and its products to meet all demands.
6. Make the most efficient use of the limited supplies of material and equipment.

### Legal Committee

The legal committee's program for 1942 was approved. It calls for revisions in the suggested

*(Continued on Page 68)*

### COMPACT HIGHLIGHTS

**Completed plans for Compact Commission, in cooperation with state regulatory bodies and the petroleum industry, to give maximum aid to federal Government in war program.**

**Gov. Leon C. Phillips, chairman, and all other officers reelected. Headquarters to remain at Oklahoma City.**

**Elected executive committee of five members who will meet monthly to carry on many of the activities of the compact.**

**Appointed research and coordination committee of top technical men from state conservation bodies who will pool information on production procedure to aid in general adoption of best practices.**

**With six states contributing, commission will have enlarged funds for coming year's program.**

**Investigations will be made quickly covering petroleum industry's reserve position, its present ability to produce, and materials required to maintain and expand present operations.**

**Commission asked federal pricing agency for "fair and compensatory prices" to "insure the ability of private enterprise to discover new reserves" and "to prevent premature abandonment of wells of small and settled production."**

# The OIL AND GAS JOURNAL

PRODUCING REFINING NATURAL GASOLINE PIPE LINE

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# The Compact Challenges

On Saturday, Oklahoma's hard-hitting and budget-balancing governor, Leon C. Phillips, agreed to continue as chairman of the Interstate Oil Compact Commission. He didn't want the job again because he, in common with other members of the commission, has plenty of other things to do which will take his full time and energy.

But Governor Phillips could see as others did at the Oklahoma City meeting that the oil compact and all that it stands for may be at the crossroads. It can stop or turn in the wrong direction at this crisis in its affairs and its usefulness is ended for all time. The alternative is to forge ahead under a revised and enlarged program to accomplishments which will pay dividends now and later.

Some within the industry continue to ask why the compact should now be continued and others have suggested that it might be well to shelve it for the duration. These suggestions come from those who think of the compact as a superorganization whose powers of control have been taken over by the war agencies at Washington.

A little straight thinking should dispel this approach to a condition which concerns every operator regardless of size or activity. The compact is not an outside agency but in a very real sense is a part of the petroleum industry and was created to serve it.

The compact in simplest terms is an instrumentality of cooperation among the oil states without authority to enforce any suggestions it may make. Authority lies with the state regulatory bodies and here also many do not realize the situation that exists.

Broad powers have been given to the state conservation departments but in actual practice most of the accomplishments in conservation have come from the operators themselves. At hearings and in groups, the industry's engineering talent has solved operating problems in large and small fields under a wide range of pool conditions. Seldom has it been necessary for state officials to overrule the recommendations of operators.

Thus, practices under the compact in effect rest with the action of the operators acting voluntarily for their collective good. The governor says this "is doing things by democratic processes."

Oklahoma's governor points to the fact that under this method of operation the petroleum industry has met every demand and was ready when the defense plans were announced. He knows of no reason why the same operating procedure should not now be the basis for taking care of this country's war needs in petroleum.

The Compact Commission will have to have plenty of help from the industry—now more than ever before. It has no million-dollar budget to draw on in establishing a staff and carrying on its work.

It has appointed a committee of technologists from the state conservation departments to carry on investigations and make reports which will be of great value to the industry, and to Washington whose needs will receive first consideration in any program that comes under the commission's direction. Every operator has a duty to private enterprise and to his country and its allies to give full cooperation to members of the committee in obtaining the operating information which it will require.

The Compact Commission's plans for 1942 deserve the full support of the industry's associations and societies whose membership has a direct interest in seeing that the oil business remains in the oil country.

The easy thing for oil operators to do in this war emergency is to sit back and take orders. A war economy always furnishes many who are willing to give them. The patriotic thing to do is to preserve individual initiative, consolidate the gains of the past and expand those activities which have given this country its oil.

If that is done—again we quote the governor—"we shall not lose that which we are fighting for."

*Speakers' table at the mass meeting of the oil industry in California last week. At the microphone is E. E. Pyles, chairman of District 5 production committee. Others at the table are A. L. Weil, general chairman for District 5; C. S. Jones, transportation-committee chairman for District 5; W. L. Stewart, Jr., refinery-committee chairman, District 5, and C. S. Beesemyer, marketing-committee chairman, District 5*

# *Expect to Complete Details of California Plan By January 1*

LOS ANGELES, Calif., Dec. 22.—The production plan for the California oil industry will be put into effect immediately, E. E. Pyles, chairman of the production committee for District 5, which formulated the plan, said in presenting it to a mass meeting of the oil industry at Los Angeles, Calif., in an all day session last Wednesday. The committee is trying to complete details by January 1. The plan was accepted December 11 (see The Oil and Gas Journal, December 18).

In substance, the plan requires the production committee for District 5 to supervise the development and production of oil in California with due regard for efficient methods so that oil reserves and critical materials are conserved. The amount of production is to be based upon the requirements set by the OPC but the committee is expected to encourage development of new reserves. Pending further developments, the present staff of the Conservation Committee of California Oil Producers is to handle all details of the program, and is now working on this assignment.

The plan is expected to be effectuated in cases where cooperation of producers may not be forthcoming by the medium of discouraging the handling by transporters, refiners, or marketers, of oil produced contrary to its provisions.

The industry's position in the war effort, as well as the effect of the production plan on the other branches of the industry, was also fully discussed at the meeting, at which more than 1,000 oil men and others interested were present.

The plan establishes principles of production practice in California by which the industry is expected to give its activities during the emergency. It covers the formulation of field development plans, drilling program, and fixing of production quotas. Consideration of good engineering practice and the need for conservation not only of oil but also of critical materials is paramount, according to Mr. Pyles, except where special requirements make it necessary for the OPC to require greater production for crudes of special quality. In addition, the plan prohibits the arbitrary transfer of allowables, which has been a troublesome question in California for many years.

Starting with the development of newly discovered fields, the plan requires the production committee for the district "with the assistance of the owners and operators" to prepare plans for their orderly development, "including proper well-spacing practices and the consummation of unit or cooperative agreements for development, pressure maintenance, or repressuring, designed to effectuate the maximum practicable recovery with a minimum expenditure of critical materials."

## Smackover Lime Production Reported in Patnos Prospect

MAGNOLIA, Ark., Dec. 23.—Interest in the southwestern Arkansas area is centering on Barnsdall Oil Co., 1 Edgar Bond, NW SW 11-15s-24w, where an excellent Smackover lime producer is reported unofficially. The Smackover was topped at 6,300 ft. but as the well has been drilled tight, no further information is being given out by the operating company. The well, about 1½ miles south of the Hempstead County line will, if successful, extend the belt of Smackover production well to the north of present limits and in a region where it is nearly 1,000 ft. shallower than at Buckner, the nearest Smackover pool, 12 miles to the southeast.

## ICC Rate Hearing Is Recessed

After receiving testimony on December 18 and 19, Interstate Commerce Commission adjourned the hearing at Washington, D. C., called in connection with the case known as Docket 26570 instituted in June 1935 by the commission for considering reduction of pipe-line rates and gathering charges.

## DEATHS

**BELVARD J. PRICHARD,** 85, eastern gas operator, died at Huntington, W. Va., December 18, from complications developing from a hip fracture. A native Kentuckian, Mr. Prichard moved to West Virginia in 1881. In 1908 he organized the Belvard Oil & Gas Co. This company and two others were combined in 1912 into the Southern West Virginia Oil & Gas Corp., and Mr. Prichard became president. His widow and several children survive.

**WILLIAM HARLE CARRICK,** 67, employe of Sinclair Prairie Oil Co., died December 20 in a Tulsa hospital, after a 5-week illness. He was a native of England, and came to America nearly 42 years ago. He became a naturalized American citizen. He had been with Sinclair Prairie for 25 years. His widow and a daughter survive.

**ISAAC HORTON JOHNSON,** 53, president, Johnson Oil Refining Co., Chicago, died December 14 at his home in Evanston, Ill. Mr. Johnson was one of the founders of the company he headed, and had been active in its affairs since its founding 32 years ago. Mr. Johnson was born in Pennsylvania, and graduated from Pennsylvania Military College. His widow and two children, a son and a daughter, survive.

## Compact Plans for Major Role in War's Prosecution

*(Continued from Page 66)*

law for oil states which had previously been approved by the commission. This includes statutes to cover the legal phases of repressuring and recycling. The committee will prepare a synopsis of the regulatory statutes of the oil-producing states. Other plans provide for a study of the relationship between the U. S. Government and the states concerning the legal aspects of oil and gas conservation. The committee will also prepare a skeleton statute that could be adopted in nonproducing states or in states having small oil production.

A recent report of the engineering committee which outlined a complete conservation program in the production of crude oil was approved. E. De Golyer, Dallas, Tex., is chairman of this committee, which will continue its work. Mr. De Golyer, who is now director of research for the Office of Petroleum Coordinator for National Defense, attended some of the sessions here.

### Colonel Thompson

Colonel Thompson, who recently returned to his duties as chairman of the Texas Railroad Commission following a year's military service, predicted that the demand for crude oil in this country would increase to 5,000,000 bbl. daily before the end of 1942. He expressed doubt that present fields could produce that quantity of crude oil over a long period, without waste. He offered data to show that present net crude-oil stocks available for transportation totaled less than 50 days' supply. He urged that the Government accumulate 60,000,000 bbl. of crude oil and 50,000,000 bbl. of gasoline. He advocated an immediate advance of 25 cents per barrel in crude oil with an increase to $1.60 per barrel in southwestern fields in the near future. He said this price was necessary to encourage producers to find new oil reserves and to protect present output from wells of small production.

In addition to those previously named the following members of the compact attended the meeting: F. R. Frye, representing P. J. Hoffmaster of Michigan; Warwick M. Downing of Colorado; Clarence T. Smith of Illinois; J. L. McHugh, representing Gov. Sam H. Jones of Louisiana, and Parker Melvin of Pennsylvania.

## THE MARKETS*

CRUDE OIL: Demand continues firm. Daily production for the third week in December was the second highest average registered during the year. Markets are strong.

REFINERY PRODUCTS: Lend-lease buying on the Gulf Coast and Atlantic seacoast coupled with high domestic demand has tightened prices. Shift of tankers from the Gulf-East Coast service to the Pacific also is a contributing factor.

TANK WAGON AND POSTED DEALER: There were no changes other than local fluctuations.

FINANCIAL: The range of trading was again narrowed. Average of 30 representative stocks for the week ended December 20: High, 26.45; low, 24.91; close, 25.18. Week ended December 13: High, 26.82; low, 23.76; close, 25.65.

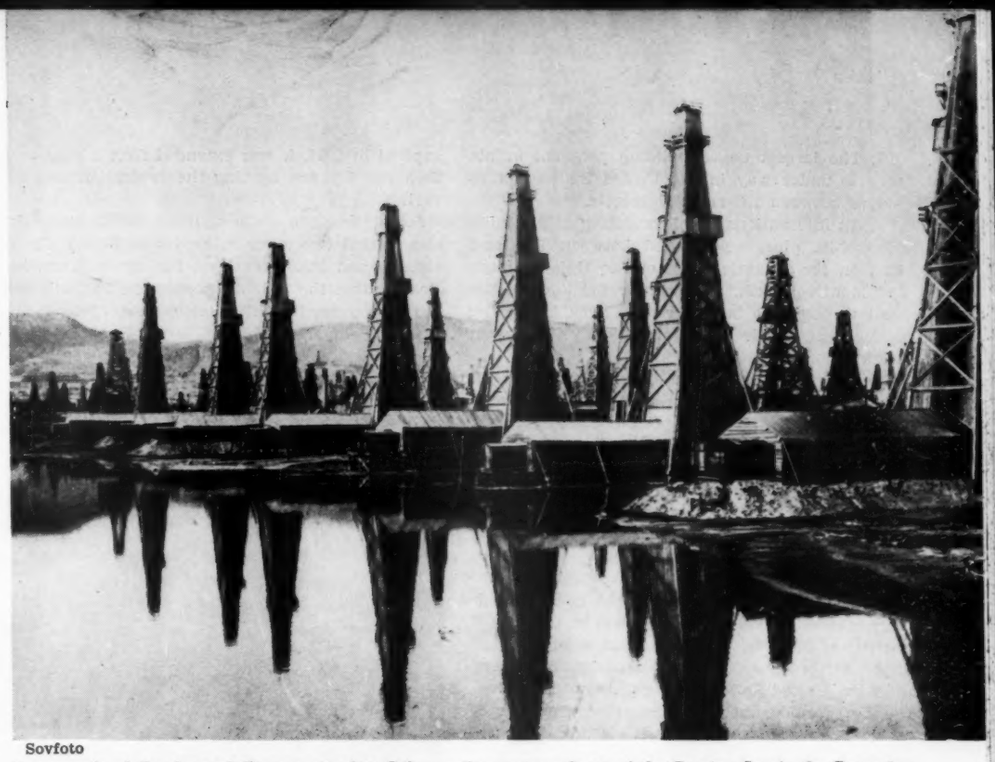
*Detailed information in the Market Section.

**World crude-oil production increased again this year to an estimated total of 2,222,535,000 bbl., largely because of higher rates of output from the United States, Venezuela and the U.S.S.R.**

**The war forced significant reshaping of petroleum markets, trade routes and had a sharp impact on transportation. There was a distinct trend toward shortening tanker routes in an effort to avoid dangerous waters.**

**The sharp revival of Venezuelan production to a new peak after the country had suffered a severe decline during the first war year was South America's outstanding development of 1941. There were a half dozen new fields discovered or indicated in that country during the year.**

**Iran, Iraq, Saudi Arabia, Bahrein Island and the Netherlands East Indies were the chief sufferers from the war. All lost additional markets.**



Sovfoto

***An example of the dense drilling practiced in Baku on the western shores of the Caspian Sea in the Caucasian region of the U.S.S.R. More than 70 per cent of Soviet production is drawn from this area***

# *World's Petroleum Industry Resists Strains of War*

**By J. P. O'DONNELL and H. STANLEY NORMAN**

STRAINS and stresses of war on the economic and social aspects of civilization distorted and reshaped elements in the world's petroleum industry this year—threatened even more significant changes in the future—but left unaltered the general trend of progress.

Total production increased, new refining techniques were hastened to commercial fruition by exigencies of the war, greater drilling depths were achieved in several parts of the world, and the transportation of petroleum soared to unprecedented heights. Many of the petroleum industry's accomplishments were confined to the United States and practically all were in countries of the Western Hemisphere.

On the debit side of 1941's petroleum ledger were retrogressions in crude-oil production in Asia and Europe, the arrest of technical-refinery development in the Eastern Hemisphere and the loss of an estimated total of more than 100 tankers at sea by war action. Spread of the war to the Pacific, drawing the United States into direct combat, while a matter of only 3 weeks' duration, has unleashed the greatest drive in history for production of a specific petroleum product, namely, 100-octane gasoline. For duration of the war, most of the technical research and development in production of the highest quality aviation motor fuels will be reserved for exclusive use of the Allies.

Later, the war-born exigencies for superfuels is certain to have a sharp impact on motor fuels of the future when peace is restored.

Most significant developments in world production during the year were:

1. The sharp upward reaction in Venezuela which lifted output there to a new peak of approximately 227,000,000 bbl. annually.

2. Substantial upward revision in estimates on yield from fields in the U.S.S.R., based on data disclosed in February by the Secretary of the Central Committee of the Communist Party.

3. The rise of production in Argentina, featuring general expansion of operations by the national company, Yacimientos Petroliferos Fiscales, particularly in the western Province of Mendoza where the country's most prolific well is located.

4. Vigorous prosecution of exploratory drilling operations in Colombia by practically all concession holders in an effort to stem the decline in crude production.

5. Declines in the output of producing countries around the Persian Gulf and in the Netherlands East Indies because of war restrictions on the markets in the Mediterranean and in the western Pacific.

6. Continued decline of production in the absence of normal drilling in Rumanian fields.

7. Another abrupt increase in Anglo-Egyptian Oilfields, Ltd.'s recovery from the Ras Gharib field, near the coast of the Red Sea.

## Transportation Facilities Taxed

One of the most acute demands made on the world's petroleum industry resulting from the war has been on the transportation facilities. Shifting character of the war itself has been magnified several times in its effect on petroleum-transportation requirements. Practically all producing countries have been compelled to increase the flexibility of their oil-transportation systems in order that large quantities of products can be made available on short notice at remote points. Added to the transportation requirements of war is the necessity for moving oil from new fields or through supplemental facilities because of indirect repercussions from the world conflict.

Major additions or changes to the world's petroleum-transportation mediums either now in service, planned, or contemplated include the following:

1. Pipe is on the ground for 100 miles of 12-in. line from Venezuelan Petroleum Co.'s new Santa Barbara field, in the northwestern part of the State of Monagas, eastern Venezuela, to the Caribbean Sea terminal of Puerto La Cruz.

2. Construction is practically completed on 33 miles of branch line linking Mene Grande Oil Co.'s Leona (formerly El Tigre) field, in the State of Anzoategui, eastern Venezuela, with the 16-in. trunk from Oficina to Puerto La Cruz.

3. Completion was reported of a small line from the Budafapuzta (Lispe) field in southwestern Hungary to Budapest, capable of handling nearly 4,000 bbl. of crude daily.

4. Two new Mexican lines serving the Poza Rica field, one leading to Barra de Tuxpam paralleling an old line and the other extending to Alamo. Capacity of the line from Poza Rica to Atzcapotzalco was raised 7,500 bbl.

5. Temporary discontinuance of service through Iraq Pipe Line Co.'s carrier from the Kirkuk field to the eastern Mediterranean continued to the end of the year.

6. Two major pipe-line projects continued to receive consideration in Argentina. One line may be built from the new producing fields in the Province of Mendoza to San Lorenzo on the Rio Parana. An international line may be built from the Sanandita field in Bolivia to refineries operated by Y.P.F. (Argentina) in the Province of Salta.

7. The largest tanker-building program in history is under way in the United States and involves between 150 and 200 vessels.

8. An international line, consisting of 236 miles of 12¾-in. pipe, was opened between Portland, Me., on the Atlantic Coast of the United States, and Montreal, Que., to eliminate the long tanker haul through the St. Lawrence River in making delivery of South American oil to refineries in the interior of Canada.

9. Reports credited German engineers with removing the pipe line laid before the war between Gonfreville, on the West Coast of France, to Rouen, a refining center near Paris and relaying the pipe as a segment in a system from Ploesti to the Danube River city of Moldova.

The most drastic change in distribution of the world's petroleum during the year occurred on July 26 when oil exports to Japan were terminated by the United States. This traffic had diminished considerably from its peak of 88,000 bbl. daily reached in 1938 but even through the first 4 months of this year shipments had been made to Japan at the rate of 46,500 bbl. daily. Five days after the United States embargo became effective, the Netherlands East Indies abrogated an agreement under which Japan was receiving far eastern oil at the rate of 30,000 to 35,000 bbl. daily.

## Japanese Supply Severed

Combined shipments from the United States and the Netherlands East Indies to Japan during the first 7 months averaged around 81,500 bbl. daily, or at the rate of nearly 30,000,000 bbl. annually. Japan's civilian and military consumption in 1940 totaled around 40,000,000 bbl. Cessation of petroleum shipments to Japan may have been an important factor in outbreak of the war in the Pacific on December 7, although most observers estimate that the Nippon oil stocks are sufficient to conduct war operations for an extended period.

Japan is credited in this report with indigenous crude-oil production of 11,000 bbl. daily to which should be added synthetic manufacture of possibly 25,000 bbl. daily.

Some analysts place Japan's petroleum production at a considerably higher figure which includes practically all yield from Sakhalin, the north half of which is owned by Soviet Russia.

So far as is known, the contract under which Japan received a development concession on checkerboarded divisions of the productive areas in North Sakhalin was not renewed this year when the agreement covering this consideration expired. The contract with the U.S.S.R., first arranged in 1925, after Japan had seized the north half of the island by military force in 1920, had a primary term of 10 years. The agreement provided for equal division of the North Sakhalin fields between Soviet and Japanese interests on a checkerboard pattern. When the original contract expired in 1935, it was extended first 1 year and then for 5 years, making the expiration date in 1941.

Soviet trusts built a refinery at Khabarovsk, also started two other refineries in 1940 at Komsomolsk and Nikolayevsk on the Amur River, indicating that the U.S.S.R. needed the Sakhalin oil and, therefore, had little incentive to extend the Japanese contract.

Soviet engineers planned to produce 8,800,000 bbl. from Sakhalin in 1942. Estimates on production within the mainland portion of Soviet Russia have been revised upward this year on the basis of information disclosed at a meeting of the central committee of the ruling political party early in 1941 before the German invasion was launched. Party spokesmen declared that petroleum production totaled 234,920,000 bbl. in 1938; 244,215,000 bbl. in 1939, and 249,318,000 bbl. in 1940. The figures include natural-gasoline output for which adjustments have been made in the world crude-oil production table. The estimate for 1941 is conjectural. Under the Soviet 5-year plan, crude production of 394,000,000 bbl. was the goal for 1942 but this objective was established before the U.S.S.R. went to war.

Exploratory efforts have been concentrated in the Ural-Volga section for more than a year. Nearly 200 drilling units of various types were sent from the United States alone during the latter part of 1940 and the early months of this year for service in the Ural-Volga district and in the northern part of Siberia.

World production of crude oil continued to rise in 1941 despite the extension of the war to new and more distant fronts. According to preliminary estimates, world production totaled 2,222,535,000 bbl., an increase of 64,412,000 bbl., about 3 per cent.

Through the first 28 months of the war none of the world's major producing areas has been subjected to the destructive effect of siege warfare. Some of the small fields in Central Europe have changed hands but they occupy only an infinitesimal part of the international oil picture.

While all major oil areas have escaped physical damage, there have been substantial changes in some of the individual operations. Complete loss of the European market has been a blow to the Near East fields because a large part of that production, either as crude or as refined products, was shipped to the continent via the Mediterranean.

*Ditching machine operating on a South American pipe-line project*

## Supply Lines Shortened

The war has forced a general shortening of supply lines. Ownership of the oil has been abandoned as the chief consideration in distribution and attention has turned to the safety of transporting crude and products from centers of supply to points of consumption.

The major developments in world production in 1941 were the continued rise of output in the United States and the revival of record withdrawals from Venezuela. Latest official figures from Venezuela show a peak production for the year of more than 681,000 bbl. daily in October but preliminary reports indicate that upward trend

***Drilling was pushed this year to distances 7½ miles from the eastern shore in Lake Maracaibo where derricks are mounted on long-reinforced concrete casions such as shown here ready for submersion***

***Small production has been developed on the eastern shoreline of Brazil. Exploration is continuing in several parts of the country and indications are encouraging the Government to sponsor additional drilling***

continued to another peak of around 750,000 bbl per day near the close of the year. Information did not disclose for what period Venezuela's production was sustained at the peak figure.

The increase in Venezuela's production was the outstanding development in South America. The bulk of the increase came from Lake Maracaibo fields but exploratory work was most productive in eastern Venezuela where a majority of the drilling took place outside of established producing areas. Four of the half dozen new fields proven or indicated were in the State of Anzoategui. The others were the possible discovery of the Texas Co., Ltd., in Guarico where 1 Mercedes, about 125 miles west of El Roble, found oil sands at 4,358 ft. and the Venezuelan Petroleum Co. 1 Santa Barbara in the State of Monagas which opened a new field at 4,321 ft.

Pool openers in Anzoategui were Mene Grande Oil Co. 2 Santa Rosa which produced 2,000 bbl. daily from 6,536-51 ft., the same company's 2 L. G., which produced 2,000 bbl. per day from two zones at 6,486-6,504 ft. and 6,294-6,306 ft., and its 13 OS which produced 400 bbl. from 5,300 ft. The Texas Co., Ltd., 1 Rincon Largo opened a new pool which entered the list of shipping fields in July. Socony-Vacuum Oil Co., C.A. 1 Anaco, about 70 miles northwest of the Roble field and in the State of Anzoategui, is believed to have established a new drilling-depth record for South America. Hole was carried to 11,294 ft.

Completions in the first 9 months lagged behind the record for a similar period in 1940. Completions in the Lake fields averaged 14 a month through September and those in other parts of the country averaged 32 monthly for the same period. A year ago, the completion average for the same 9 months were 20 and 37, respectively. The Lake Maracaibo fields, including Lagunillas and Tia Juana, the two largest in the country, account for nearly 61.5 per cent of Venezuela's total crude production. Yield from Tia Juana was about 25,000 bbl. per day higher this year than in 1940 while that from Lagunillas was up about 20,000 bbl. daily.

An increase of 23,500 bbl. in the daily average production from the Oficina field elevated that area to third position in the quantitative ranking. Quiriquire, the only other field in eastern Venezuela producing at a rate exceeding 50,000 bbl. daily, declined this year. Among the newer fields, Jusepin, San Joaquin, and El Roble contributed the most substantial quantities to Venezuela's higher producing rate. Drilling under the water of Lake Maracaibo has been gradually extended until operations are now carried out 7½ miles from the shore. Companies engaged in development of the submerged reserves have developed a special technique, involving the use of caisons made of steel-reinforced concrete as foundations for derricks and auxiliary equipment.

### Mendoza Exploration Successful

Continued success of exploratory drilling in the Province of Mendoza with a substantial increase in production from fields previously discovered in that western part of Argentina featured 1941 activities. Y.P.F., the Argentina Government oil agency, had 29 drilling rigs assigned to exploratory work during the year. The Comodoro Rivadavia area, Province of Chubut, southeastern Argentina, had 12 of the rigs, 8 operated in the Province of Mendoza, 5 in Neuquen, and 4 in the Province of Salta in the northern part of the country.

Comodoro Rivadavia is the most important source of production in Argentina and this year contributed 74 per cent of the country's total output of crude estimated at 21,735,000 bbl. A new zone in the Comodoro Rivadavia area, known as South Tordillo, was advanced to commercial production during the early part of 1941 and contributed substantially to another increase for the general district.

Y.P.F. discovered production in the Loma Negra area, 11 miles northwest of the Plaza Huincul octagon and another indicated discovery was at Portezuelo, 20 miles southwest of Plaza Huincul.

Two producers were completed as extensions to the Tupungato field in Mendoza. Five miles north of former producers in the Lunlunta field, Y.P.F. proved the "north dome" productive with two flowing wells. Production from the Province of Mendoza this year is approximately double the output for 1940 and the caliber of wells there, the largest in the country, indicates that this trend will continue indefinitely.

Discovery of what appears to be a new field in Colombia by Compania de Petroleo Shell on its Yondo concession, near Barranca Bermeja, was the most significant development of the year in that country. Still, the general spread of exploratory drilling was considered of almost equal importance because of the prospects that other similar discoveries will follow. Shell's indicated discovery is considered capable of producing 500 bbl. daily, or more, from 7,150 ft. Testing is still under way. Richmond Petroleum Co. of Colombia, subsidiary of Standard Oil Co. of California, started a deep wildcat test on the Villamizar concession in the Magdalena Valley area of Colombia late in the year. Across the river east from Richmond's exploratory operation, Socony-Vacuum's affiliate, Cia. de Petroleo del Carare started another wildcat late in the year exploring concessions north of the Des Mares producing property.

The most important operation on the Barco concession developed by Colombian Petroleum Co., jointly controlled by the Texas Co. and Socony-Vacuum, is the testing of Cretaceous zones in the valley west of the Petroleo producing area. Failures have been drilled at several points in the concession to the Tertiary sands.

The Cretaceous produces at shallow depths on Petrolea north dome. Through the first 9 months of this year, Colombian Petroleum Co.'s production from the Barco concession averaged 12,084 bbl. daily, a slight increase compared to the average of 11,497 bbl. daily maintained during 1940. From November 1939, through September 1941, crude runs through South American Gulf Oil Co.'s 12-in. line, extending 263 miles westward from the Barco concession to the terminal at Covenas, have totaled 7,931,110 bbl. of 45° gravity oil.

Development of the Agua Caliente concession

***Additions this year to A.N.C.A.P.'s refinery at Montevideo, Uruguay, shown below, increased its capacity 25 per cent***

**WORLD CRUDE-OIL PRODUCTION BY CONTINENTS AND COUNTRIES**
(Data in thousands of barrels)

| Continent and country— | 1941 | 1940 | Change | Daily ave. 1941 | Daily ave. 1940 |
|---|---|---|---|---|---|
| North America: | | | | | |
| Canada | 10,000 | 8,718 | +1,282 | 27 | 24 |
| 6 Mexico | 40,380 | 41,876 | —1,496 | 111 | 115 |
| 1 United States | 1,398,000 | 1,338,237 | +59,763 | 3,830 | 3,656 |
| Total | 1,448,380 | 1,388,831 | +59,549 | 3,968 | 3,795 |
| Per cent | 65.4 | 64.4 | | | |
| South America: | | | | | |
| 9 Argentina | 21,735 | 20,476 | +1,259 | 60 | 56 |
| Bolivia | 275 | 237 | +38 | | |
| 8 Colombia | 24,400 | 26,864 | —2,464 | 67 | 73 |
| Ecuador | 1,650 | 2,475 | —825 | 4 | 7 |
| Peru | 12,800 | 12,451 | +349 | 35 | 35 |
| 10 Trinidad | 21,100 | 20,300 | +800 | 58 | 55 |
| 3 Venezuela | 227,000 | 186,134 | +40,866 | 603 | 622 |
| Total | 308,960 | 268,937 | +40,023 | 847 | 739 |
| Per cent | 13.9 | 12.6 | | | |
| Europe: | | | | | |
| France | 500 | 496 | +4 | 1 | 1 |
| Germany* | 9,500 | 9,275 | +225 | 26 | 25 |
| Hungary | 3,300 | 1,875 | +1,425 | 9 | 5 |
| Italy† | 1,250 | 1,480 | —230 | 3 | 4 |
| 7 Rumania | 40,100 | 42,500 | —2,400 | 110 | 117 |
| 2 U.S.S.R.‡ | 242,000 | 241,839 | +161 | 663 | 661 |
| Total | 296,650 | 297,465 | —815 | 812 | 813 |
| Per cent | 13.4 | 13.8 | | | |
| Africa: | | | | | |
| Egypt | 8,050 | 6,550 | +1,500 | 22 | 18 |
| Per cent | 0.3 | 0.2 | | | |
| Asia: | | | | | |
| Bahrein Island | 7,070 | 7,200 | —130 | 19 | 20 |
| British India | 2,245 | 2,150 | +95 | 6 | 6 |
| Burma | 7,900 | 7,750 | +150 | 22 | 21 |
| 4 Iran | 64,150 | 79,290 | —15,140 | 176 | 217 |
| Iraq | 9,875 | 25,450 | —15,575 | 27 | 70 |
| Japan§ | 3,800 | 3,840 | —40 | 10 | 10 |
| 5 Nethelands East Indies | 61,000 | 65,150 | —4,150 | 167 | 177 |
| Saudi Arabia | 4,250 | 5,350 | —1,100 | 12 | 15 |
| Total | 160,290 | 196,180 | —35,890 | 439 | 536 |
| Per cent | 7.2 | 8.8 | | | |
| Miscellaneous | 205 | 160 | +45 | .... | .... |
| World's total | 2,222,535 | 2,158,123 | +64,412 | 6,089 | 5,897 |

*Includes Poland, Austria and Bohemia-Moravia. †Includes Albania. ‡Includes part of Sakhalin production and for preinvasion period part of 1941 from Upper Ukraine. §Including Taiwan and part of Sakhalin.

of eastern Peru to commercial stature is in prospect for the near future. The concession owned by Cia. de Petroleo Ganso Azul (Blue Goose Oil Co.) is at the headwaters of the Amazon River and now contains at least four and possibly six commercial oil wells. The company has started construction of a 300-bbl. straightrun refinery which will be completed in about 3 months. Completed wells have registered initial yields in brief test periods ranging up to 100 bbl. per hour.

Brazilian interests are reported to be negotiating for 60,000 bbl. of Agua Caliente crude oil per month which may be moved east through the Amazon River system. Meanwhile, Brazil continued drilling in an effort to develop an indigenous petroleum supply.

Peru's commercial production, estimated this year at 12,800,000 bbl., is drawn from three areas. The International Petroleum Co., Ltd.'s La Brea-Parinas concession produces 80 per cent of the total and remainder comes from properties of Lobitos Oilfields, ltd., Zorritos, Villar and Pirin.

### Hungarian Operations Expanded

An outstanding development in Europe was the increase in Hungarian production. The Budafapuszta (Lispe) field in southeastern Hungary is currently producing at the rate of about 10,500 bbl. daily. This increase in outlet was made possible by completion of a pipe line to Budapest. Magyar Amerikai Olajipari, R.T., the producing company, has intensified drilling in the Budafapuszta field and is reported to be planning an extensive drilling campaign in the Lovaczy field, 11 miles north, during 1942.

Rumania's production has been permitted to continue downward, probably for the reason that transportation facilities are insufficient to move larger quantities of petroleum to Germany.

Another substantial increase in production was registered by Egypt, the only producing country in Africa. Drilling has been prosecuted on an expanded scale during most of the year in the Ras Gharib field. Exploratory operations by several of the American and British companies have been discontinued temporarily.

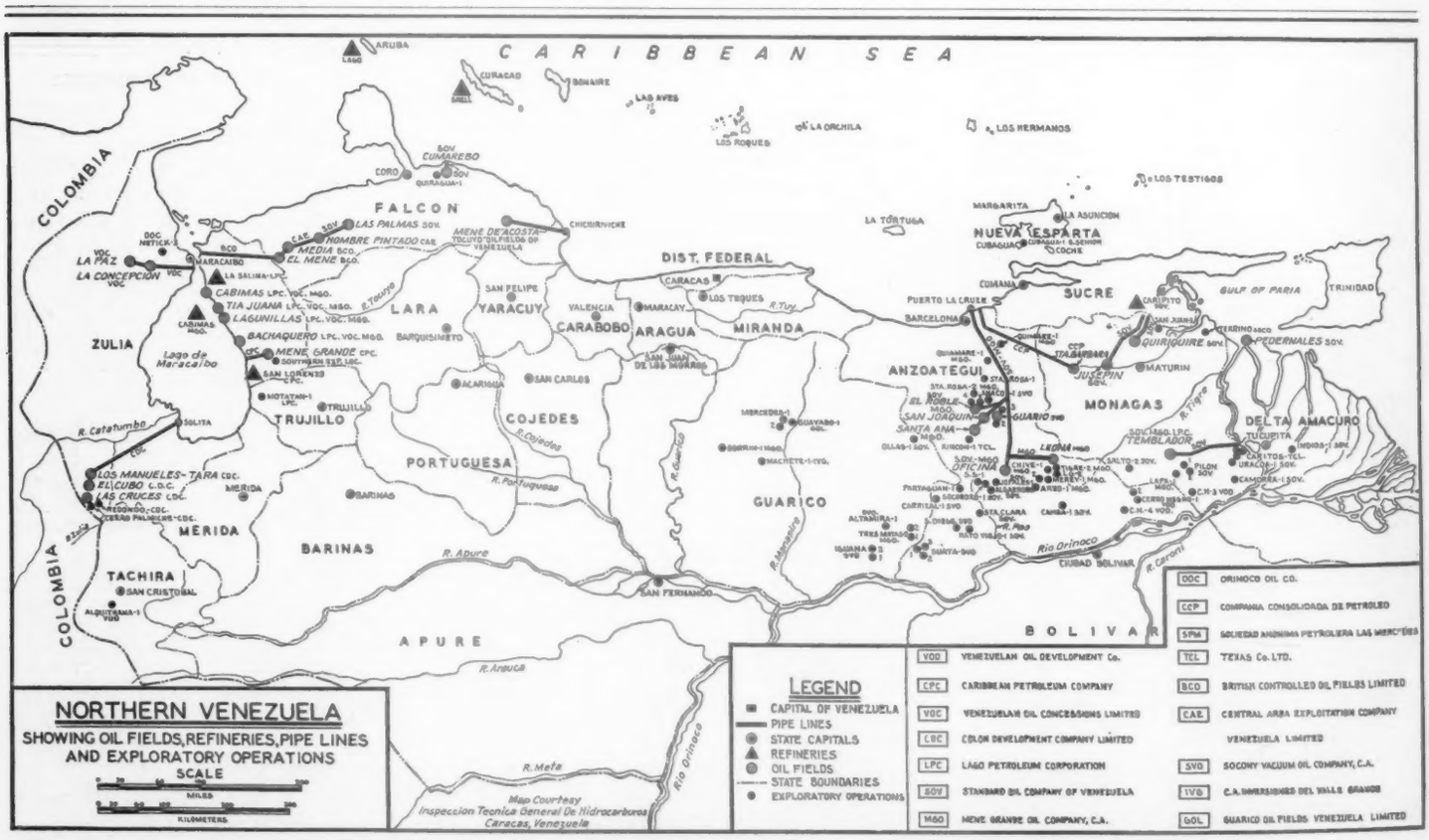
Asiatic production declined decisively in 1941 entirely as the result of lost markets and revisions in trade routes. The greatest decline was in Iraq where production dropped to an estimated 9,[illegible]73,000 bbl. from 25,450,000 bbl. in 1941.

Another substantial loss was suffered by Iran, directly as the result of a loss of markets.

The Netherlands East Indies, Saudi Arabia, and Bahrein Island were similarly affected. Cessation of exports to Japan in midyear cost the Netherlands East Indies an appreciable market.

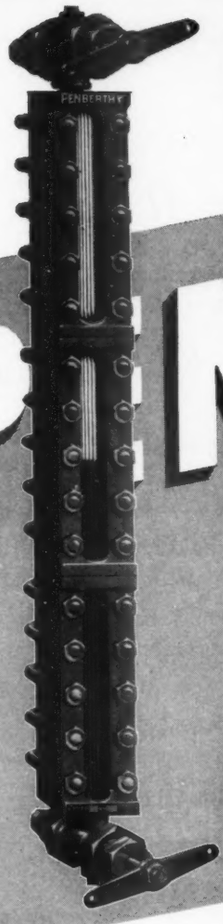
## VENEZUELA—SUMMARY OF PRODUCTION AND WELLS

| | 1940 | | 9 months, 1941 | | | Well data as of October 1, 1941 | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Total production | Daily average | Total production | Daily average | Total to October 1, 1941 | New wells drilling | Natural flow | Gas-air lift | Pumping | Closed in | Inactive | Abandoned | Total wells drilled | Wells completed Jan.-Sept., 1941 |
| North fields | 19,324,559 | 52,799 | 15,587,991 | 57,099 | 399,709,205 | 1 | 179 | 15 | 633 | 109 | 292 | 129 | 1,357 | 46 |
| Tia Juana | 36,946,186 | 100,946 | 34,372,651 | 125,907 | 190,082,112 | 3 | 192 | 33 | 227 | 60 | 24 | 2 | 538 | 9 |
| Lagunillas | 58,464,785 | 159,740 | 48,963,425 | 179,353 | 995,640,539 | 3 | 261 | 58 | 796 | 141 | 160 | 82 | 1,498 | 71 |
| Bachaquero | 1,682,959 | 4,598 | 139,947 | 513 | 6,195,870 | 0 | 2 | 0 | 0 | 41 | 34 | 0 | 77 | 0 |
| Total Lake fields | 116,418,489 | 318,083 | 99,064,014 | 362,872 | 1,591,627,726 | 7 | 634 | 106 | 1,656 | 351 | 510 | 213 | 3,470 | 126 |
| La Paz and Concepcion | 1,288,199 | 3,520 | 1,127,393 | 4,130 | 28,582,538 | 1 | 11 | 0 | 80 | 32 | 16 | 6 | 145 | 4 |
| Tarra and Manueles | 6,196,869 | 16,931 | 4,760,399 | 17,437 | 67,081,889 | 2 | 21 | 1 | 57 | 13 | 26 | 17 | 135 | 5 |
| Mene Grande | 10,812,402 | 29,542 | 9,002,058 | 32,975 | 229,365,083 | 2 | 42 | 13 | 151 | 87 | 133 | 23 | 449 | 17 |
| El Mene and Media | 321,803 | 879 | 185,776 | 680 | 24,788,430 | 0 | 4 | 17 | 24 | 133 | 0 | 146 | 324 | 0 |
| Cumarebo | 1,630,785 | 4,456 | 1,445,098 | 5,297 | 27,599,195 | 0 | 36 | 1 | 11 | 27 | 29 | 14 | 118 | 0 |
| Quiriquire | 21,676,451 | 59,225 | 15,666,449 | 57,386 | 187,922,322 | 0 | 112 | 0 | 40 | 120 | 9 | 15 | 296 | 0 |
| Pedernales | 1,795,888 | 4,907 | 1,194,782 | 4,376 | 8,372,924 | 0 | 9 | 0 | 0 | 2 | 3 | 5 | 19 | 0 |
| Temblador | 3,994,215 | 10,913 | 2,486,847 | 9,109 | 12,487,722 | 0 | 59 | 0 | 0 | 12 | 4 | 15 | 90 | 0 |
| Oficina | 15,414,106 | 42,115 | 17,922,802 | 65,651 | 35,879,544 | 11 | 155 | 7 | 1 | 17 | 20 | 24 | 224 | 80 |
| Jusepin | 3,995,154 | 10,916 | 4,522,574 | 16,566 | 9,033,844 | 3 | 68 | 0 | 0 | 4 | 5 | 1 | 78 | 21 |
| San Joaquin | 1,097,562 | 2,999 | 1,912,529 | 7,006 | 3,051,814 | 3 | 15 | 0 | 0 | 1 | 0 | 1 | 17 | 7 |
| Guario | 16,033 | 44 | 85,899 | 315 | 101,932 | 2 | 0 | 0 | 0 | 2 | 0 | 0 | 2 | 1 |
| El Roble | 654,379 | 1,788 | 1,211,713 | 4,438 | 1,867,917 | 2 | 4 | 0 | 0 | 0 | 0 | 0 | 4 | 2 |
| Santa Ana (M.G.O.) | 75,790 | 207 | 123,956 | 454 | 235,158 | 0 | 2 | 0 | 0 | 1 | 0 | 0 | 3 | 1 |
| Santa Ana (Texas) | ..... | ..... | 15,810 | 58 | 15,810 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Leona | 17,551 | 48 | 44,973 | 165 | 62,755 | 2 | 0 | 0 | 0 | 8 | 0 | 0 | 8 | 6 |
| Hombre Pintado | 658,093 | 1,798 | 434,927 | 1,593 | 1,950,491 | 1 | 3 | 8 | 8 | 13 | 0 | 9 | 41 | 4 |
| Las Palmas | 42,461 | 116 | 18,186 | 67 | 366,805 | 0 | 0 | 0 | 3 | 1 | 5 | 4 | 13 | 0 |
| Santa Rosa | ..... | ..... | 168,632 | 618 | 168,632 | 2 | 1 | 0 | 0 | 0 | 0 | 1 | 2 | 1 |
| Netick | ..... | ..... | 24,545 | 90 | 106,367 | 1 | 0 | 0 | 0 | 2 | 0 | 0 | 2 | 0 |
| Others | 28,160 | 77 | 38,851 | 142 | 3,440,398 | 6 | 2 | 0 | 0 | 48 | 0 | 355 | 405 | 10 |
| Total Venezuela | 186,134,390 | 508,564 | 161,459,113 | 591,425 | 2,234,109,296 | 46 | 1,178 | 153 | 2,031 | 874 | 760 | 849 | 5,845 | 285 |



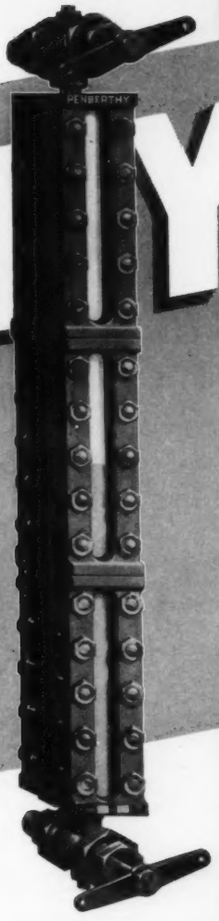

*Fields, refineries and pipe lines of Venezuela, showing the growing importance of the eastern part of the country where a half dozen new fields have been discovered or indicated during the year*

PENBERTHY *Reflex*
DROP FORGED STEEL
LIQUID LEVEL GAGES



Liquid shows black—empty space shows white. Preferred wherever liquid level must be easily and positively visible . . . and when liquids are under high pressure or at high temperature.

PENBERTHY
DROP FORGED STEEL
*Transparent*
LIQUID LEVEL GAGES



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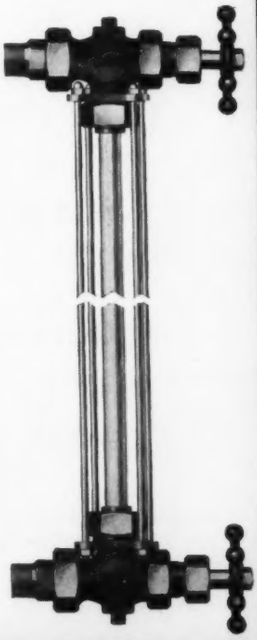

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Some of the questions which will confront the individual refiner who is considering what part he can take in the government's program may be listed as follows:

1 What processes are available for making the blending agents going into 100 octane gasoline?

2 What raw materials are required for each constituent?

3 What is the minimum size plant that may be practical?

4 What are the costs involved, such as installation, operation and royalties?

5 Can the aviation gasoline unit be fitted into present refineries?

6 What price is being paid for 100 octane gasoline?

7 What disposition could be made of these plants after the war?

—GEORGE B MURPHY, technical editor, in *National Petroleum News*

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# Red Tape Cut in Regulations On Exports of Equipment

By HENRY D. RALPH

**This analysis details procedure for the exportation of oil-field equipment.**

**Much of the red tape previously surrounding the export of equipment to Latin-American countries has been eliminated by centralization of the control in the Board of Economic Warfare.**

**Heavier demands for metals and materials in prosecution of the expanded war program may reduce the volume of equipment available for export.**

**The recently revised regulations, however, provide for a clearance system whereby applications for export license and preference rating on the required material are passed on simultaneously.**

WASHINGTON, D. C., Dec. 22.—Difficulties of exporting oil-industry machinery and equipment from the United States to Latin American nations have been increased by the outbreak of shooting war because of the heavy new demands for metals and materials of all kinds and the shortage of shipping, but the red tape and delays involved in getting permission to ship have been very much simplified in recent weeks.

All matters involving exports are now centralized in the Board of Economic Warfare, formerly called the Economic Defense Board, which has been strengthened by the addition of units from several other federal agencies dealing with foreign trade. A clearance system has been set up through the cooperation of the board and the Office of Production Management whereby applications for export licenses and for priorities to obtain the materials to export are passed on at the same time and with less delay and confusion than formerly.

Shortly before war was declared the board was working toward the policy of promoting and expediting exports to Latin America so that friendly nations in this hemisphere might share equally with the United States in the limited supplies of essential materials needed both for defense and for established businesses.

This policy, and the new system of clearance, remain unchanged as a result of the war, but there is now less of everything to go around because of the increase in military needs and the necessity of conserving such strategic materials as steel products, nonferrous metals, rubber, alloys, chemicals, manila fiber, and all things used by the oil industry, particularly those imported from the Far East.

### Little Coordination Previously

Until a few months ago there was little coordination among the various agencies involved in exporting and no clear-cut policy. The administrator of export control, an Army officer, determined what articles were subject to export licenses. The Division of Control of the State Department actually issued export licenses. The Priorities Division of OPM passed on applications for preference ratings to obtain materials to export. The Office of Inter-American Affairs and the Department of Commerce attempted to promote exports but had no official relationship to the agencies which actually controlled exports. Frequently an exporter would obtain an export license but be denied priority aid to get the material, or vice versa. Applications for export licenses were granted, delayed, or denied without explanation and there seemed to be no definite policy in passing on them. Established export houses complained that they were denied licenses to serve old customers in Latin America, while new fly-by-night concerns seemed to be able to get licenses for the same materials. Another complaint frequently heard was that when private firms were unable to get priorities or export licenses, users in Latin America were able to work through their governments and their embassies in Washington to bring pressure through the Department of State and that this threatened to break down the system of private trade and make all exporting a government monopoly.

### What Plan Does Not Mean

Now that the priorities system is being converted into a system of allocations, the needs of Latin-American nations are being taken into consideration in every allocation and rationing plan. This does not mean, of course, that the export trade will be allotted all the supplies desired, but that actual requirements of foreign customers will be given due weight in apportioning the uses of steel and other materials.

It is the determined policy of administration officials to meet the essential-trade requirements of the American nations.

In announcing the tin-plate allocation, the Supply Priorities and Allocations Board stated that the action constituted the first step in a simplified procedure designed to assure delivery of essential commodities to meet the needs of Latin America. Under the new program, definite amounts of certain commodities will be allocated for export when approved by SPAB on recommendation of the Board of Economic Warfare.

In the future, governments of importing countries will be given an opportunity to recommend approval or disapproval of orders by individual importers. These recommendations will be given full consideration by the board in order to assure the most effective use of materials exported by the United States. The exact mechanics of the procedure to be followed is expected to be announced very shortly.

As tentatively outlined, a summary of the new procedure is as follows:

1. Recommendations of the governments of American republics are being requested as a guide to the determination of the most essential uses and the consignees to whom it is most important to ship an article to be exported.

2. Pending receipt of such information and in order to avoid delaying all exports, the board is attempting to act promptly on applications for licenses covering immediate shipments. Applications for later shipments will be considered in the light of recommendations submitted by the governments of the importing nations.

3. As soon as possible, a system will be inaugurated whereby respective importers in the other republics may apply to their governments for certificates indicating that the proposed importations are recommended by those governments. These certificates will be transmitted to the American exporter and submitted by him with the export license application to the Board of Economic Warfare. The BEW will give due weight to the recommendation of the importing government as expressed by this certificate in its consideration of export license applications. It will henceforth be unnecessary to submit applications through the foreign embassy or legation in this country.

4. Many general and individual licenses are being canceled in order to adjust exports to the allocation and rationing systems in this country and because many of the outstanding licenses were of little value since materials to export under them were not available. The allocation system, when it gets into full operation, is designed to assure deliveries by suppliers, and will be more effective than the general licenses which merely constituted permission to export.

5. Where outstanding licenses have been revoked, shippers are advised to file application at once for new individual licenses. They are requested to submit with them the originals of the revoked licenses and to show the expected date of shipment on the new applications wherever this information is available.

6. In order to facilitate consideration of new applications, manufacturers of export articles made from materials under allocation are requested to submit to the Office of Export Control in the BEW as early as possible, schedules showing quantities proposed for delivery, the delivery date, and license numbers, where available, covering proposed exports of this article to the other American Republics.

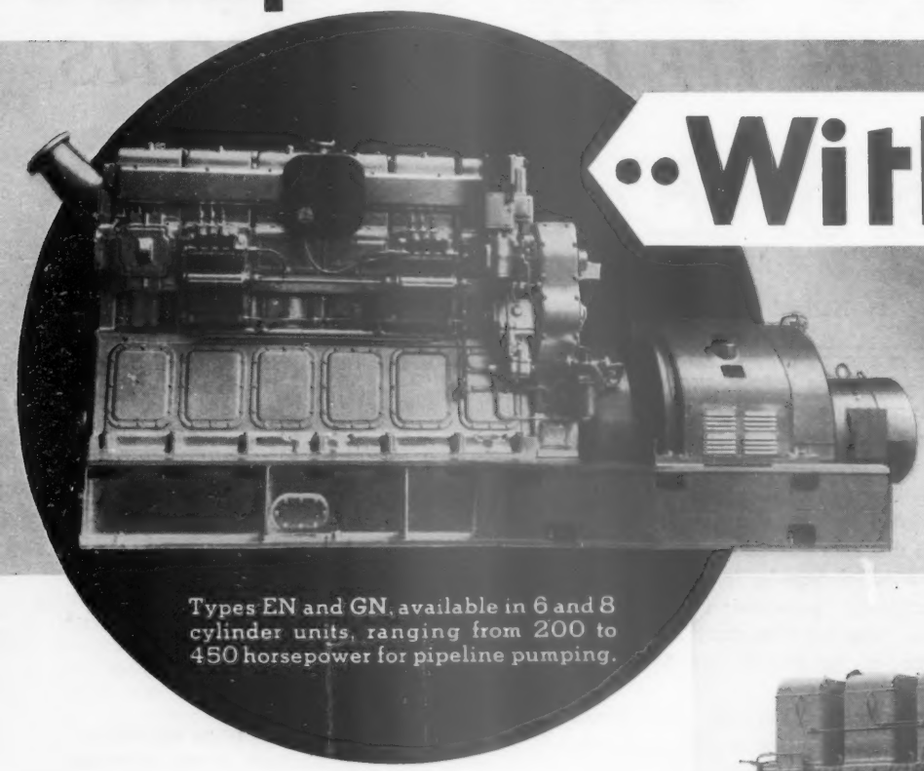
### Speed License Approvals

Meanwhile the Office of Export Control has greatly speeded the work involved in passing on export license applications, particularly where priorities are also concerned, through the establishment of a clearance procedure. The Office of Export Control now constitutes a central agency through which an exporter, manufacturer, or a foreign importer may submit export proposals. Clearance through this office offers the assurance that all other government agencies concerned have been consulted and their approval obtained. If a priority rating is required, this will be obtained in the course of clearance provided the exporter submits a properly filled out priority application on Form PD-1 along with the application for an export license.

*( Continued on Page 291)*

# Pump It Thru' Pipelines ..

## ..With C-B Diesels



Types EN and GN, available in 6 and 8 cylinder units, ranging from 200 to 450 horsepower for pipeline pumping.

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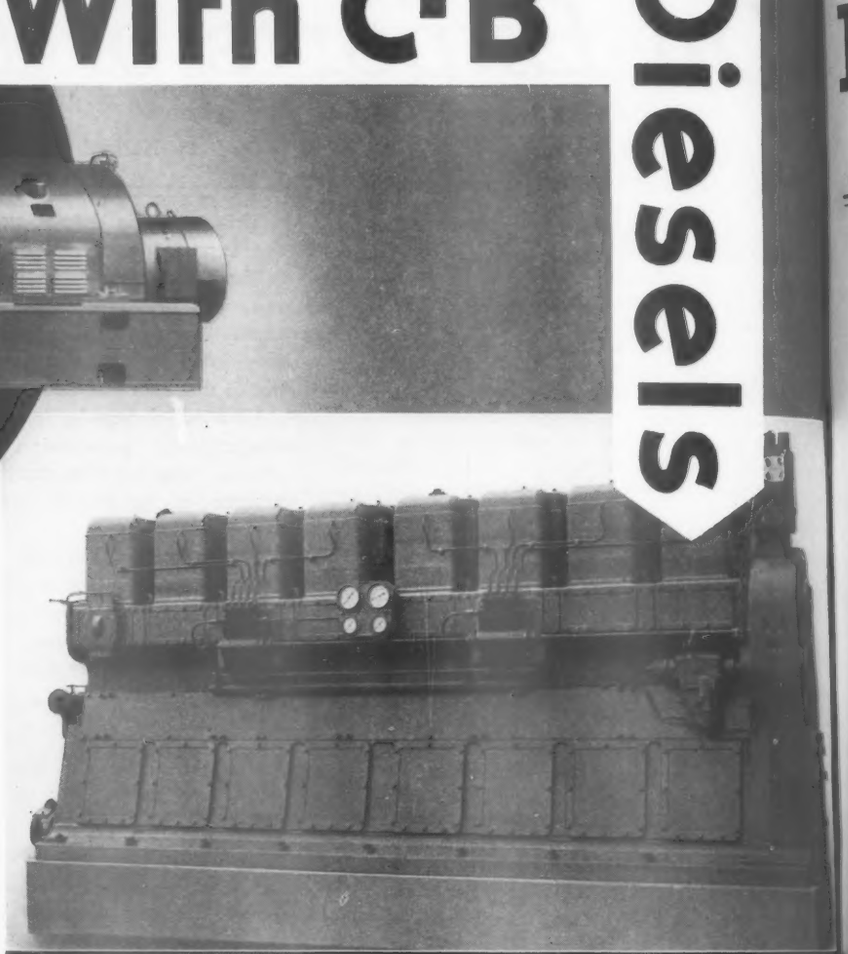
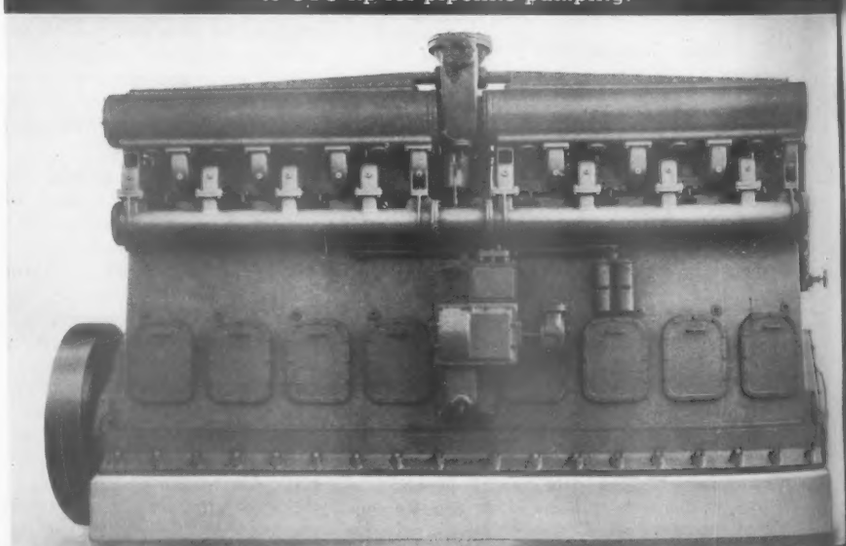
**If gas is cheaper and more convenient, there are C-B gas engines to match every diesel model. And, if you're thinking of their salvage value after the crisis, they're all convertible from one fuel to the other. That's worth considering!**



Type JS, built in 5, 6, 7 and 8 cylinder units, rated 425 to 675 hp for pipeline pumping.



Type LS, 5, 6, 7 and 8 cylinder units, rated 625 to 1,000 horsepower for pipeline pumping.

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# Mountains Give Soviet Oil Fields Stout Protection

By L. DAVID WOSK

### THE AUTHOR

The author of this article, a petroleum geologist and engineer, has made a special study of the U.S.S.R. petroleum economy as related to the war in Europe. His extensive travels through the Soviet fields, China, Japan and most countries in western Europe give Mr. Wosk particular qualifications for analyzing the importance of Russian oil and to appraise the elements of protection upon which the Allies depend for resisting aggression.

The foundation of Mr. Wosk's intimate acquaintance with fields of the U.S.S.R. was gained when the International Geological Congress was held in Moscow.

He is a graduate of the Colorado School of Mines and has practiced his profession in the employe of several American oil companies, including Marland Oil Co., Shell Oil Co., Inc., and White Eagle Oil & Refining Co. In addition, he has handled many geological and engineering projects in the capacity of a consultant.

*Trainloads of oil in German tank cars behind the battle front in the U.S.S.R. Nazi forces are completely dependent on ability to maintain a petroleum-supply line to fuel its mechanized equipment*

*L. DAVID WOSK*

DOES Germany need the Soviet Caucasus oil field in order to continue the war? If she is compelled to try to take them, what are the factors involved? Can the Caucasus fields be cut off entirely and how serious to the Soviet Union would a German drive to the Caspian Sea be? How are these problems likely to affect the United States, especially the petroleum industry of this country?

The first question can be answered only by consideration of Germany's available storage, her production of crude oil and synthetics at the beginning of Germany's attack on June 21, 1941, as balanced against her wartime consumption. Space does not permit a detailed examination of these factors at this time. Prior to any discussion, it must be noted that the last complete, authentic statistics were for the year 1938, published in 1939. All subsequent figures from Europe, irrespective of their source, are of necessity limited by censorship or propaganda. (For more detailed consideration see The Oil and Gas Journal, October 12 and 19, 1939.) However, a general analysis can be given.

In 1938 Germany produced 3,861,000 bbl. of crude oil. The U. S. S. R. produced 205,000,000 bbl. The remainder of Europe produced 54,335,000 bbl. By the end of 1939, Germany had absorbed Austria, Czechoslovakia and the oil fields of Poland had been divided between Germany and the U. S. S. R. In 1940 Gremany acquired the production of Rumania, Hungary and France. Albania's oil fell to Italy, placing that oil also under German domination. Thus by the middle of 1941, according to the best available information, Germany controlled 55,390,000 bbl. per year crude-oil production while the Soviets' output, exclusive of that from Sakhalin Island, had grown to 217,109,000 bbl. per year.

In addition to her crude oil Germany produces large quantities of synthetic products from coal. Her 1938 production was approximately 15,000,000 bbl. and her 1941 production is estimated as high as 40,000,000 bbl. Thus Germany during 1941 would have available from all sources 95,390,000 bbl. plus any storage remaining at the end of 1940. This storage would of necessity be reduced by bombings and the production of Rumania's and Poland's fields, which accounted for 52,127,000 bbl. in 1938 and 47,714,000 bbl. in 1940 would be reduced similarly after the start of the Soviet-German war.

### Supply Totals 260,000 Bbl. Daily

Not taking the destruction of any of this production into consideration, the supplies available to Germany may be estimated at approximately 260,000 bbl. per day. That part of Europe now under German domination had a normal peacetime consumption of 171,423,000 bbl. in 1938. If this consumption has been reduced by as much as 90 per cent, this still requires 46,500 bbl. per day. Transportation of supplies and other military uses on a nonfighting day require considerably more than this amount and the expenditures of oil on a fighting day are much greater.

During the first 170 days of the Soviet-German war, from June 21 to December 9, 1941, there were approximately 105 days of intensive fighting offensive when there were heavy withdrawals from storage and 65 days of lull when, probably there were some withdrawals. The net result of the last 6 months' activities in the U. S. S. R. must therefore have greatly reduced German storage, possibly to dangerously low levels.

The most reliable information indicates that the Soviet bombings of Rumanian and Polish fields, refineries, pipe lines and storage facilities,

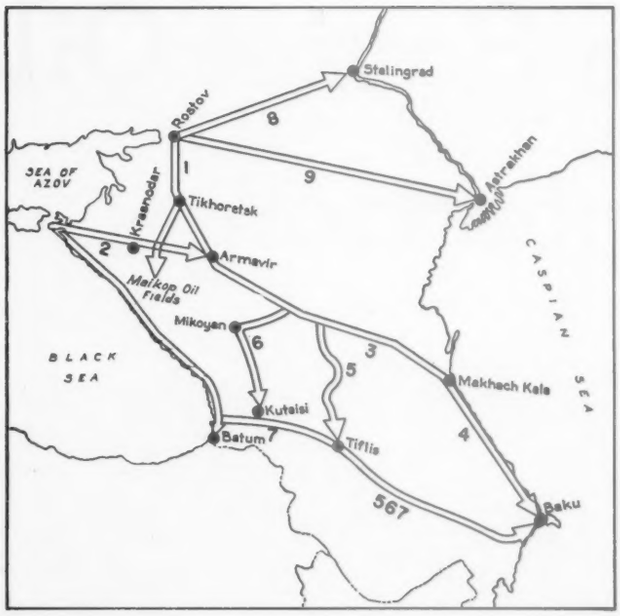


*Fig. 2—Possible routes of reaching the Caucasus oil fields which are guarded by a rugged range of mountains rising to heights exceeding 18,500 ft., 4,000 ft. higher than the American Rockies*

*Fig. 1—Principal producing areas, pipe lines, refining centers and some of the large cities in the western part of the U.S.S.R. are shown on the map below. Featured is the spread of fields in the Ural-Volga section north and east of the Caspian Sea*

plus the effect of guerrilla activities, reduced production available to Germany considerably.

The subsequent capture of the Soviet fields of Romny and Poltava, in the Ukraine, did not affect Germany as these fields were merely in the exploratory stage and production was negligible.

It is interesting at this point to note that except for Soviet oil fields, practically no petroleum suitable for the manufacture of high-grade lubricating oils is produced in Europe. Consequently, since the Soviet-German war Germany has had practically no quality lubricating oil, large quantities of which are required, especially in aviation, with the exception of supplies stored prior to the war or obtained indirectly. This critical shortage was noted as early as November, 1940, when elevator operations in Germany were suspended to conserve lubricating oils.

## Two Avenues Open

If Germany is to continue the war at its present tempo, two avenues remain open to her:

1. She must capture oil quickly and the Caucasus fields seem to be the nearest source of supply or,

2. She must force capitulation of the Soviets and by a Nazi-dictated peace acquire Soviet oil fields.

It is the opinion of the author that Germany's desperate petroleum situation dominated her all-out offensive military strategy in an attempt to accomplish one of these alternatives or both simultaneously. Germany's desperate petroleum situation may also account in a large measure for the Soviet strategy of slow retreat and of attrition of both German manpower and materials, especially oil. Soviet forces are not permitting German forces to rest at any point but are harrying them and forcing them constantly to regroup their equipment, thus further exhausting German petroleum supplies.

What does the capture of the Caucasus oil fields involve? To understand this question, knowledge of the distribution of the producing areas is required as well as knowledge of the terrain that Germany would have to traverse in taking the fields. The author is personally acquainted with these factors.

On the north flank of the Caucasus lie the Maikop and the Grozny districts, west and east respectively. The 1938 production of Maikop and of Grozny was 37,500 and 44,000 bbl. per day respectively. These figures probably have not changed materially.

The Baku region lies on the extreme southeastern tip of the Caucasus on the Caspian Sea. This region produces 430,000 bbl. per day, over 70 per cent of all Soviet oil production.

The Caucasus range of mountains, the land bridge between Europe and Asia, runs northwest-southeast from the Taman Peninsula across from Kerch on the Black and the Azov seas to the Apsheron Peninsula on the Caspian Sea. This range is approximately 700 miles long and is the highest in Europe, its peaks reaching over 18,500 ft. in altitude or 4,000 ft. higher than our Rocky Mountain peaks. It is a long, narrow range with both the northern and southern flanks very precipitous and cut by deep gorges. The foothills in which the oil fields are located are also deeply cut by narrow, steep ravines trending perpendicular to the main axis of the mountains. South of the Caucasus in Armenia, Turkey and Iran is another large mountain range with peaks ranging to 17,000 ft. This range merges with the main Caucasus in the Soviet Georgian and Armenian republics. Thus, transit along the south flank of the Caucasus in the Soviet Union is blocked. Railroads, roads and pipe lines traversing this area do so along precipitous mountain sides and

*(Continued on Page 272)*

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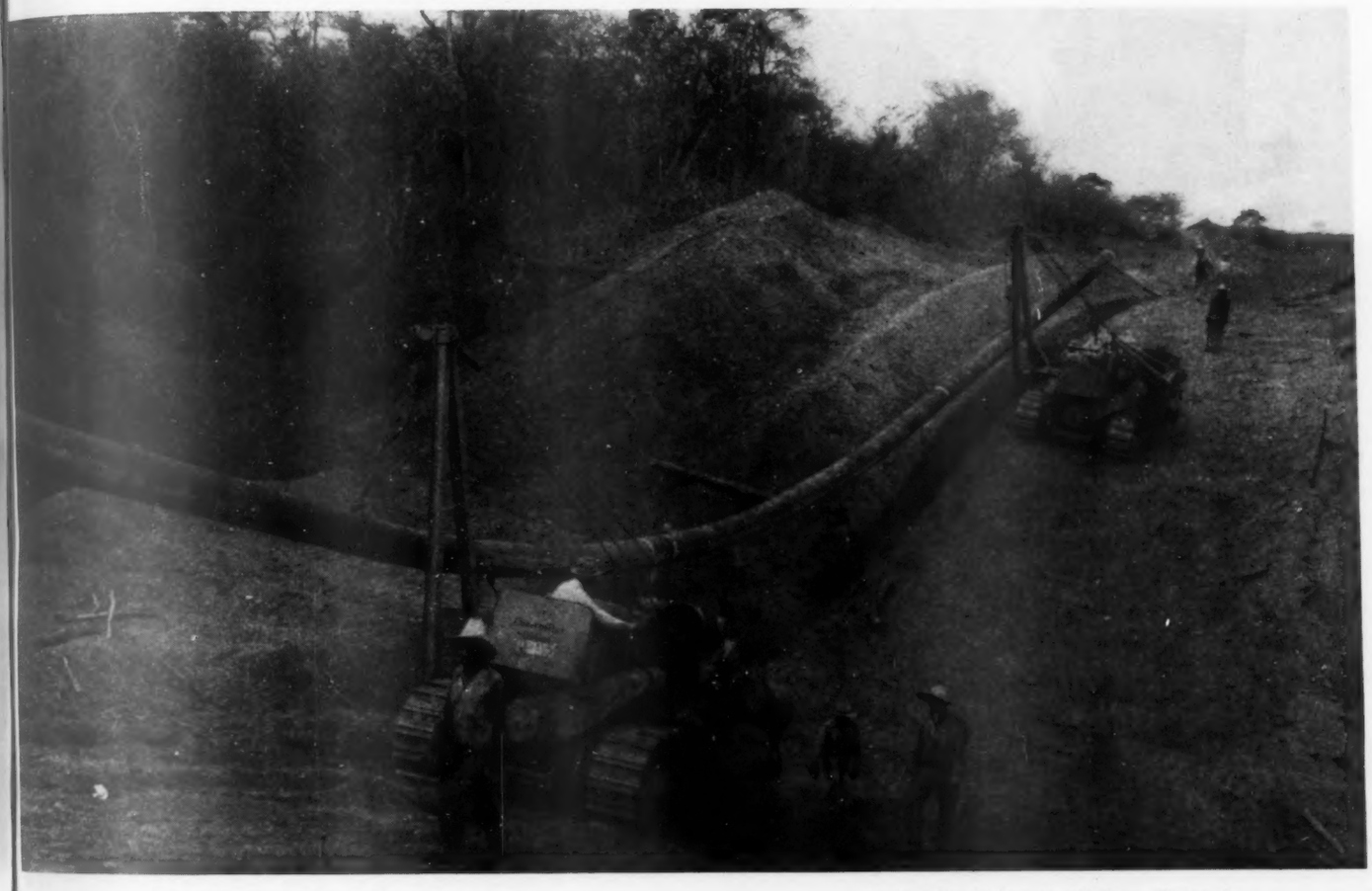

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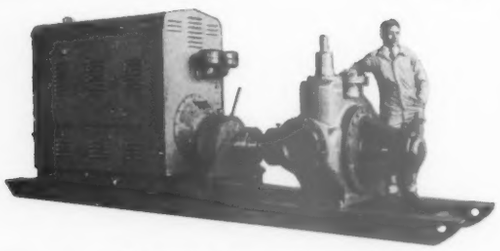

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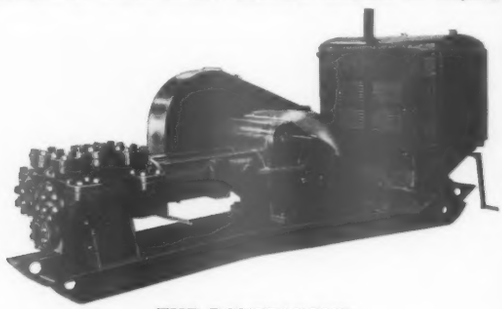

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*A producing field near the village of Sterch-Kerch, Daghestan, Caucasus, U.S.S.R.*

**SPECIAL FEATURE**

**The survey of the oil possibilities of the world contained in the pages immediately following is intended to present graphically and briefly a bird's-eye view of those foreign areas to which we may have to look for future supplies of oil and in which prospecting will be actively conducted following the cessation of the World War.**

By W. V. HOWARD

# WORLD-WIDE OIL POSSIBILITIES

THE petroleum possibilities of the world, outside of the United States, are much greater than those of the United States, and there are many areas of great size which may eventually prove as rich as similar districts in this country per unit of area.

In the maps presented on the following pages, the other continental areas have been divided into three categories depending upon the relative likelihood of finding commercial deposits of oil. The most favorable areas are those in which oil or gas is now found, either in producing fields or in seepages. They comprise areas underlain by sedimentary rocks, usually of a sufficient thickness to permit the existence of several reservoir horizons. In some instances areas have been omitted which may otherwise be favorable if these areas are remote from present activity or if our knowledge concerning them is so slight that they can hardly be said to be even reconnoitered.

Less favorable areas include these remote areas, areas with a thin cover of sediments where there are no definite structural trends, areas which may prove to be too intensely folded or areas where potential reservoirs are overlain by great thicknesses of continental deposits, glacial deposits or ice and snow.

Areas considered "impossible or improbable" are those in which there are strongly folded mountain ranges, great masses of intrusive igneous rocks or pre-Cambrian rocks. The largest regions underlain by pre-Cambrian rocks are the shields around which each of the continents has been built.

A continent, from the geological standpoint, surrounds a central shield, the margins of which were later submerged beneath the sea to form a shelf. Sediments were deposited on this shelf which was bordered by a deeper area, known as a trough. Later movements have squeezed the margins of the troughs together to form mountain ranges and usually the whole area is uplifted so that the old shield, shelf and trough become a unit. Later invasions of the sea may submerge a part of this unit and whole masses, including a part of the shield, may collapse beneath the sea.

In the United States, the whole of the Mid-Continent area together with Illinois, Michigan and Ohio are a shelf which was welded to the shield by the formation of the Appalachians. The Rocky Mountain states were finally welded to the shield by the formation of the cordillera. The Gulf Coast flanks the Appalachians and lies between them and ranges represented by the Greater Antilles. The events pictured in this brief outline are duplicated in other continents.

Collapse is seen in the submergence of the Gulf of Mexico and in the Pacific Coast area where the frayed ends of the Coast Ranges plunge beneath the sea. The Bahamas are a partially collapsed portion of Florida which is more closely associated with the Antillean arc than with the United States through much of its history.

### Large Petroliferous Zones

Surveying the continental areas, it can be seen that the Western Hemisphere and the U.S.S.R. contain the largest areas of potential oil land. The Great Plains area of Canada closely resembles Montana in its southern portion and may be compared with such areas as Michigan or western Ohio in the northern part.

By far the largest potential area in South America is the belt which begins in the north with Trinidad and the Orinoco Valley, and follows the eastern Andes into Argentina, an area 4,000 miles long and from 100 to 500 miles wide. Fields in this area are comparable to those of the California districts and the relative sizes give an estimate of the potentialities of the two areas.

The Russian Platform of eastern Europe, which overlaps into the Aralo-Caspian area may be compared with the much smaller Mid-Continent area of Kansas and Oklahoma.

If the earliest fields to be found in an area indicate in a general way the size of later fields, the Canadian Great Plains appear less promising as the only field of consequence is the Turner Valley field on the southern border of the area. Oficina and the Trinidad fields give an indication of the production to be expected in the sub-Andean area, while in the U.S.S.R. the fields now known have led the Soviets to refer to the area near the Urals as "the second Baku."

Of the more highly developed areas, the Mexican Coastal Plain, the Mesopotamian Valley, the basin of Lake Maracaibo and the Magdalena River Valley, the Irrawadi Valley and the Netherlands East Indies all boast large and highly productive fields in areas in which the amount of unprospected land is much greater than that which has been explored.

*Vespucio camp from which Yacimientos Petroliferos Fiscales directs its operations in the Province of Salta, northern Argentina*

# SOUTH AMERICA

SOUTH AMERICA is made up of four principal elements, the great central shield of Brazil, the Andine chain together with intermontane valleys, the belt between the Andes and the shield and the Pampas region. The shield is a part of the great continent referred to as Gondwanaland which embraces practically the whole land mass of the Southern Hemisphere. As this continent broke up, the inner margins were depressed and Mesozoic and Tertiary sediments were deposited. This margin forms the Atlantic Coast of Brazil. Some great depressions were also formed, such as the valley of the Amazon.

The ancient continent consisted of pre-Cambrian rocks covered by thick continental deposits including much glacial debris. In places, marine sediments have been found below the continental deposits. During the process of fracture and collapse, large masses of volcanic material were extruded on the surface, as in the valley of the Parana River. The continental and volcanic cover make prospecting difficult but do not necessarily render the finding of oil beneath impossible.

In the great trough to the west of Gondwanaland, large thicknesses of sediments were laid down and these were uplifted during the Andine revolution. As in most mountain ranges, the folding and igneous intrusions accompanying the uplift destroyed all chance of finding oil in the mountains but between individual chains and in the area between the shield and the mountains there are great thicknesses of sediments which provide potential reservoirs.

The Pampas region is comparable structurally and geologically to Wyoming and is traversed by old mountain chains from the Andes to the southwest. These ranges are similar to the Appalachians in their relationship to the shield but are not as complexly folded.

### Areas Favorable for Prospecting

Four main belts are considered most favorable for prospecting. These include the trough between the Andes and the shield, the Pampas region, the coastal plain west of the Andes and the coastal plain east of Brazil. The sub-Andean trough has production at both ends, in Trinidad and eastern Venezuela at the north and in Bolivia and the Salta-Jujuy region of Argentina at the south. Recently oil has been found in the center in eastern Peru. This whole region may therefore be compared with the productive portion of the San Joaquin Valley except that it is 4,000, instead of 200, miles long.

The Pampas region contains the important Comodoro Rivadavia and Mendoza regions and in its oil content resembles Wyoming.

The Pacific Coastal Plain has provided all of the production of Ecuador and Peru, except for the recent sub-Andean field, and may contain other fields although the position of the producing areas suggests the possibility that they lie on lines of folding which are largely submerged beneath the Pacific. In the Atlantic coastal area, chances are problematical at present.

These are largely in patches scattered over the surface of the Brazilian shield, where prospecting is difficult and the existence of marine sediments not always definite, and in the intermontane valleys in the Andes where it is believed that the thin cover and great amount of metamorphism make successful prospecting very questionable.

Inclusion of the valley of the Amazon in the area less favorable for prospecting depends almost entirely on the fact this great depression is covered by a great thickness of alluvium. It is quite possible that many of the sediments deposited in the sub-Andean region extend down the Amazon for a considerable distance. This region may, therefore, be compared with the Mississippi Basin where known potential reservoirs are so deep that other more favorable areas will be prospected long before they are sought.

# MEXICO AND THE CARIBBEAN

MEXICO and the Caribbean area form the meeting-place of two mountain systems with the splayed-out northern end of the Andes. The Andes begin to branch in southern Colombia and as the separate chains extend northward, the outer one enters the Isthmus of Panama, the central chains pass to the west of Lake Maracaibo and the eastern chain turns eastward and plunges beneath the Atlantic in the northern range of Trinidad.

The Greater Antilles from the Virgin Islands to Cuba are parts of a range whose relationships with other ranges are obscure. Many of the transverse lines of folding in Central America are associated with this line of folding and where these terminate against the western Andine chain the geology is very complex. The latter chain continues past the ends of the Antillean chains and reappears as the Sierra Madre del Sur of Mexico and again in southern California where it becomes interwoven with the southern end of the California Coast ranges.

East of this Andine-Coast Range complex is the Mexican Plateau which contains the end of the Basin Ranges and resembles Nevada and Arizona geologically. Still farther east and forming the Mexican coastal plain the Yucatan is the southern extension of the Gulf Coastal Plain with, however, certain important differences. The Jurassic rocks which lie at depths far beyond the reach of the drill in Texas are buried in Mexico under a relatively thin cover and have provided most of the important reservoirs in the area.

All the rest of the area has been submerged to form the Gulf of Mexico and the Carribean with the exception of intermontane valleys held up by the resistant mountain backbones and a chain of islands forming the Lesser Antilles. These are nearly all volcanic islands which resemble the volcanoes of the Andes in that they rest on top of a mountain range. Barbadoes represents a fragment of the shelf in front of this range.

### Areas Favorable for Prospecting

Three types of petroliferous areas are known in this region, the Coastal Plain of Mexico and Yucatan, the intermontane valleys of the Andes, and patches and strips of sedimentary rocks flanking mountain chains or fragments of chains. All three types have been partially prospected and two of them yield important amounts of oil. In the Coastal Plain area, there are some salt domes but these are at present of little importance, resembling the domes of Southwest Texas. Principal production has come from great limestone highs which have been thrown up by faulting. These include the Panuco and other northern fields, the famous Golden Lane of Mexico and Poza Rica, the principal producing area at the present time. Near the Rio Grande, small amounts of oil and large quanties of gas come from the Tertiary rocks. Yucatan is virtually unprospected at present. The northern part of the area and Yucatan may be compared with Southwest Texas as regards potentialities with the possibility of having another West Texas beneath. Both areas can be considered practically virgin territory at present. In the central part of the region, the fields resemble those of West Texas more than any other area in the United States. Except for the Tampico-Tuxpam region this district is also untouched.

The intermontane valleys provide the oil of Colombia, Venezuela and Trinidad. Eastern Venezuela and Trinidad are not between Andine chains, but lie between the southernmost range and the old pre-Cambrian shield of South America. Except for the difference in ages, the geology of the region resembles that of the San Joaquin Valley of California. The Maracaibo basin and the Magdalena Valley resemble more closely the Los Angeles Basin. Much of the true intermontane valleys has been prospected but little has been done in the area between the southeastern chain and the shield except in Trinidad and eastern Venezuela. The success that has attended prospecting here and the fact that this belt is known to be productive in Peru and Bolivia make it potentially one of the greatest known reservoirs of oil.

Of the fragmental areas, the Coastal Plain of Colombia may have the greatest possibilities as fields analogous to those of Ecuador and coastal Peru may be found here. It is possible, however, that the cover above the highly altered Andine rocks will be too thin to provide many possible reservoirs. The same is true of all of the comparable areas in the Greater Antilles, southern California, and Central America despite the small production of very high gravity oil in Cuba and the numerous seeps reported in the remainder of the area.

# EUROPE

EUROPE is geologically complex and its geology is most easily discussed on a chronological basis because of the overlapping of elements in its structural framework. The central core or shield of the continent is formed by the Fenno-Scandinavian area. During the Paleozoic, troughs existed along the west of the shield and across the whole of southern and Central Europe. Between this latter trough and the shield lies the great Russian Platform. By the Devonian, two chains of mountains had developed, down the coast of Norway and through the highlands of Scotland, and across Belgium and northern Germany. By the end of the Paleozoic the great Appalachian-Hercynian period of folding had taken place and all of southern and Central Europe was complexly folded. This folding embraced everything south of a line drawn roughly from the Caucasus through southern Ireland and this whole region can be considered as containing no oil in Paleozoic rocks.

During the Mesozoic the folded area collapsed fragmentally and sediments were deposited. These came from the north by way of the North Sea and the Ural trough, and later from the west into the Mediterranean Sea that lay north of the present Mediterranean and is known as Tethys. Renewed folding took place in Tethys during the Tertiary and two principal systems were formed. These were the Pyrenees, Alps, Carpathians and Caucasus in the north and the Atlas, Appenines, Dinaric and Tauric arcs in the south. The latter form great loops which became involved with the northern chain in the Alpine and Caucasus areas.

The Urals are an independent chain formed in a trough on the east side of the Russian Platform. They spread out and plunge beneath the Caspian plain on the south and bifurcate into the Timan and northern Urals on the north.

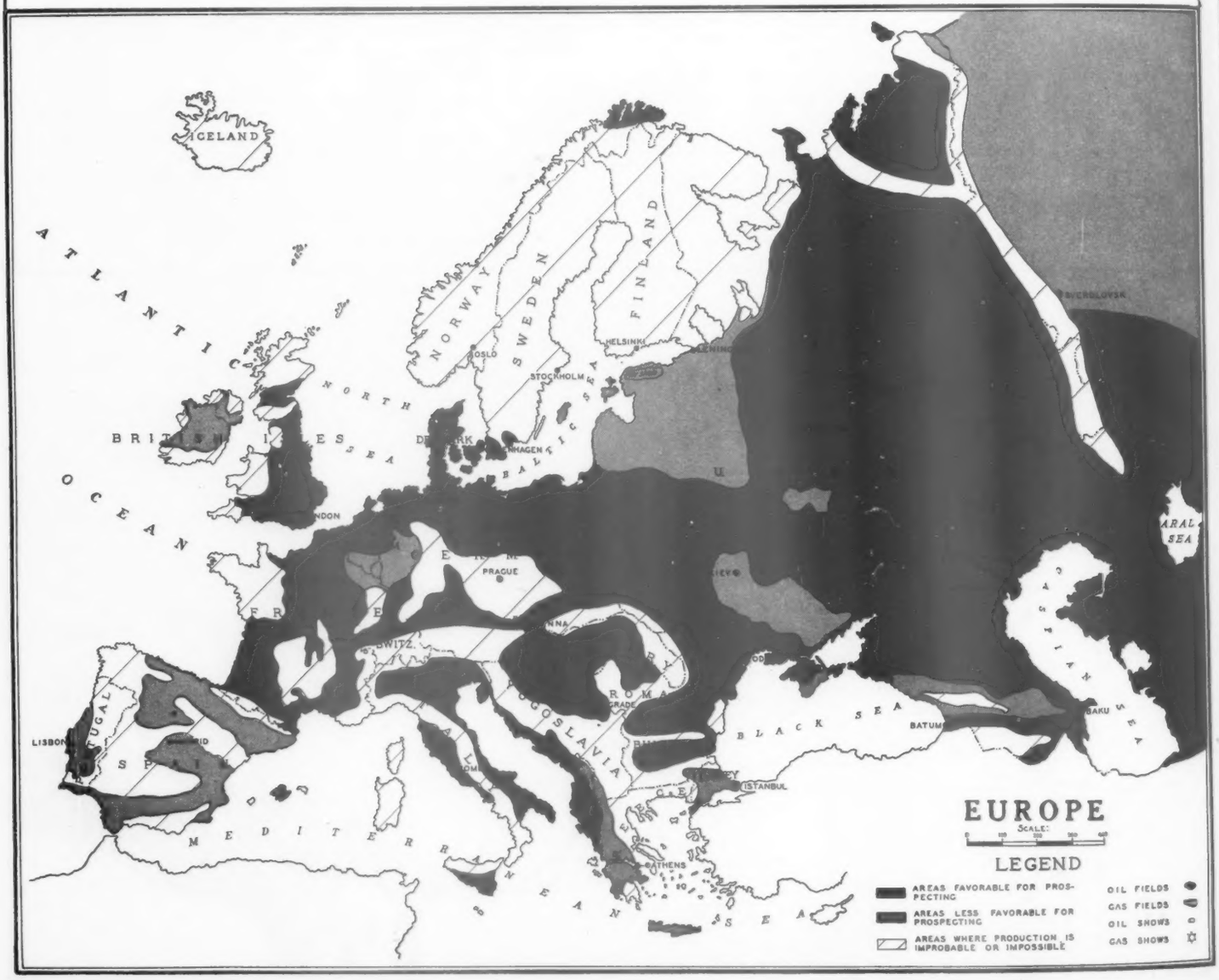
### Areas Favorable for Prospecting

These may be divided into four main classes, the foreland of the northern chain, the Russian Platform, the North German Plain and irregular areas of little disturbed sediments caught up within loops and between chains of the Tertiary mountains.

In the foreland of the Alpine chains, there are showings in front of the Pyrenees, the new fields in the Vienna basin, the Polish and Rumanian fields and the Maikop, Grosny and Baku areas of the U.S.S.R. At the present time, these areas become progressively richer towards the east, a relationship which will probably continue and may extend into Asia. Most of these fields bear little resemblance to American fields, except Baku which may be considered the same type of area as the Los Angeles Basin.

The Russian Platform resembles closely the northern Mid-Continent and may be considered the only other large potential reservoir of this type known. Despite important fields now producing, this area is virtually untouched. The North German Plain, including the Rhine Valley, contains small deposits of which many are associated with salt deposits.

The intermontane plains produce small quantities of oil in Italy, Albania and Hungary. Only the latter area promises much hope of large production.



# ASIA

ASIA includes two important regions which are discussed on other pages, namely the Near East, which is included with Africa, and the East Indies which are included with Australia.

The core of Asia is a great shield forming central and eastern Siberia. West of this is a great trough which extends into the Aralo-Caspian area. Surrounding the southern part of the shield are great arcuate mountain chains which include the Altai ranges of southern Siberia and Tian-Shan and Khingan mounatins. South of this region, the Appalachian folding was involved in the Kuen-Lun Mountains and their eastern extensions and extends far to the southeast through China and Thailand.

Essentially, this whole region was welded into a rigid complex which was crossed by an extension of Tethys which became folded in the Kuen-Lun, Tsing-ling-Shan and other Chinese ranges. The main trough, however, bordered the continent on the south and extended through Iran, into the Himalayan area where it turned south through Burma and into the East Indies. India fits into a part of this zone almost as if it had been thrust against it during the Tertiary period of folding when the Alpine-Caucasus ranges were extended to the China Sea and the southern loops were wedged against the northern folds in the Pamir of northern India and then formed the Himalaya and East Indies chain.

To the east a series of festoons lines the coast, forming an extension of the Alaskan ranges through Japan and into the Philippines and Borneo. The forelands and backlands of these festoons have both been submerged.

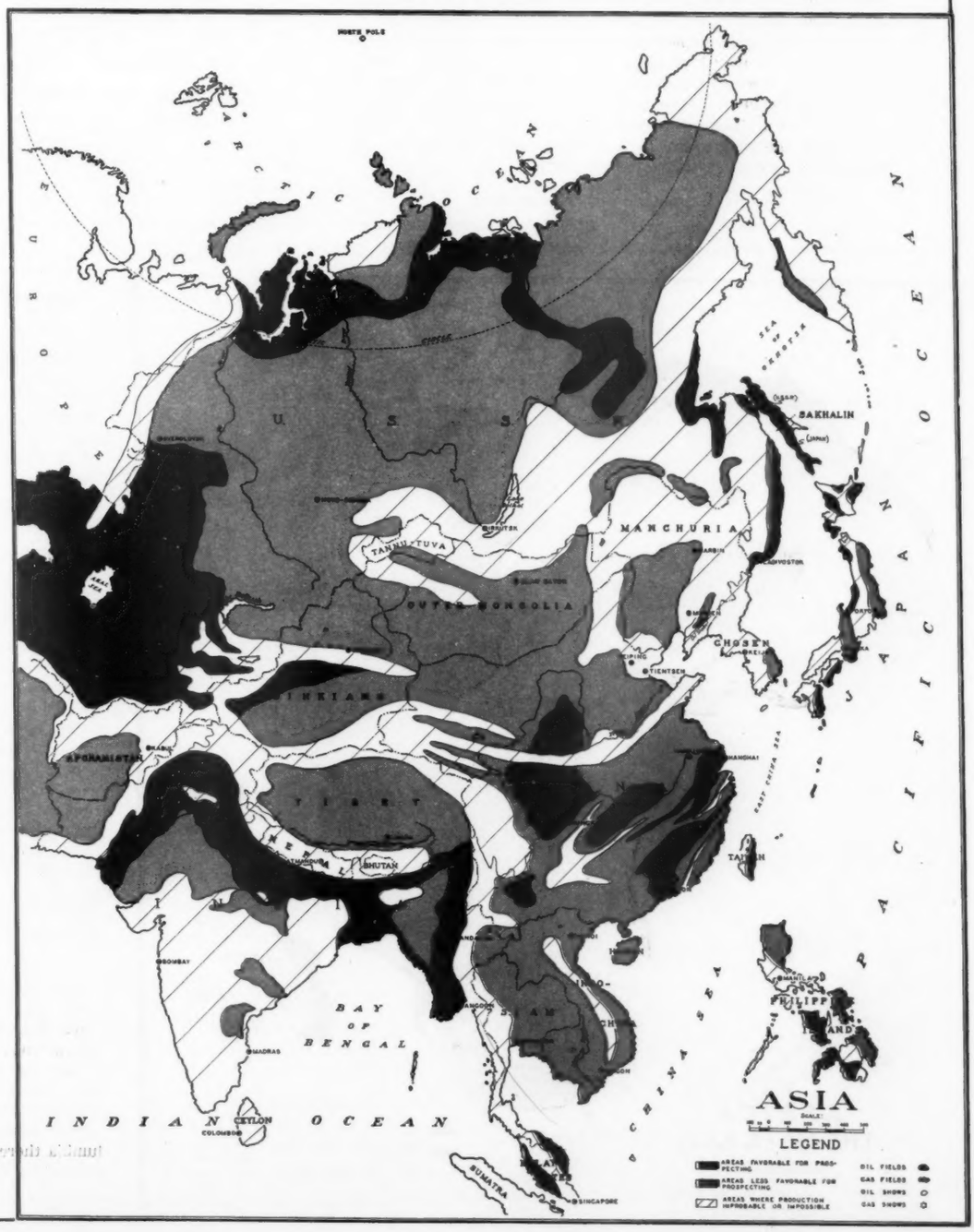
Tertiary embayments invaded Siberia from the north and extended up the valleys of the Ob and Lena rivers.

### Areas Favorable for Prospecting

Some of the areas most favorable for prospecting are extensions of two European zones. The foreland belt crosses the Caspian from Baku and is found in the Fergana region of southern Siberia. The Russian Platform passes south of the Urals into the Aralo-Caspian area where the Emba district provides important production. Added to these are two other important belts, the foreland of the southern looped chains, which produces in northwest India and Burma, and fragments of sedimentary rocks protected from collapse by close proximity to the backbone of the island festoons. These fragments are productive in Sakhalin, Japan, Taiwan and Borneo.

The whole of southwestern Siberia provides the most favorable opportunity for large-scale development. In the Indo-Gangetic plain and the valley of the Irrawadi there are good possibilities for production. In the island festoon area the most favorable areas are where the chains have branched out and the intermontane valleys are of considerable size. The important but highly localized fields of Borneo suggest that many more may be found, not only in this island but also in the Philippines.

In Sze-chuan and Shan-si there are many seeps and some production; the same is true of Sinkiang on both sides of the Tian-Shan. These occurrences suggest the possibility of fields of the Mid-Continent type in these areas but little can be said concerning them. The Arctic and Lena areas are virtually unknown but the presence of slightly folded Tertiary rocks is of interest.



# AFRICA AND THE NEAR EAST

AFRICA forms the center of the great continent which spread from the Andes to eastern Australia and included India. The first break occurred along the Strait of Mozambique between Madagascar and Africa so that submergences on the east side of Africa are greater than on the west side. The great part of the continent is a shield area with large patches of sedimentary rocks of Paleozoic age. Of these the youngest are continental and glacial deposits.

During the period of Appalachian folding which affected southern Europe, the northwestern tip of Africa was folded and there are other belts of Paleozoic folding known, particularly in the western Sahara. During the Mesozoic and early Tertiary, the northern part of the continent was submerged and this subsidence continued in the Red Sea area until much later times when Arabia was nearly separated from the rest of the continent of which it is geologically a part. Then, during the period of Alpine folding, the southern looped chains affected the margin of this continent in the Atlas and along the northeast shore of the Persian Gulf.

Included on the accompanying map is a part of Asia of which Arabia and Syria may be regarded as a marginal block of Africa. The mountain chains of Turkey and Iran lap over the margin of Africa or on the down-sunken margin in the eastern Mediterranean.

The northern chains cross from the Caucasus into the Hindu-Kush along the north border of Iran making that country an intermontane sector analagous to Hungary.

### Areas Favorable for Prospecting

Probably the only areas which afford a possibility for large production are along the northern margin of the continent in intermontane valleys of the Atlas region and in the foreland of the Zagreb Mountains of Iran. In the former area there are some small fields and many seeps and although it is possible that large fields may be found, the chances are that present fields represent a fair sample of what may be expected.

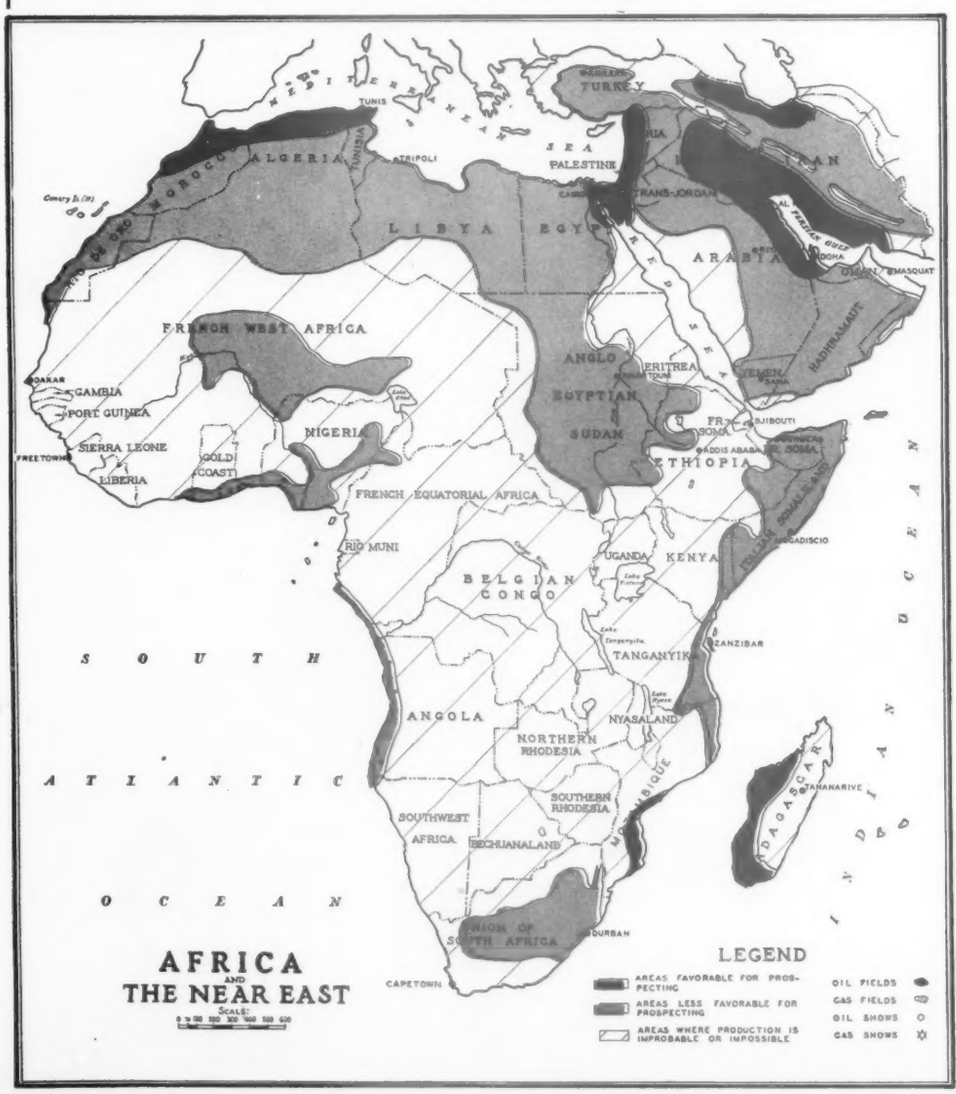
The fields in the foreland of the Zagreb Mountains form the most important group yet found in continental Asia. They have all been developed recently but knowledge of the occurrence of oil in the area is as old as human history. Recent exploration in Iraq, Bahrein, Kuwait and Saudi Arabia has extended the petroliferous zone away from the mountains so that it may extend still farther into Arabia. This possibility is increased by the occurrence of many seeps in Syria and Palestine and the occurrence of oil in commercial quantities along the Gulf of Suez. Particular importance may be placed on the comparatively small amount of exploratory drilling required to find fields in this area.

The coasts of Mozambique and western Madagascar appear to have the best possibilities for production in Africa proper, not only because of the presence of surface indications, but also because of the thicker section of marine beds.

### Areas Less Favorable for Prospecting

The Sahara-Sudan area, the Niger embayment, the Lake Chad depression and the coastal areas are all possible producing areas but the chances of finding oil in commercial quantities in Africa are believed to be less favorable than in any other continent.

The major part of the continent, including the bulk of western Africa, Ethiopia and the Red Sea area, is a complex of ancient rocks, intrusives and continental deposits.




## LESS FAVORABLE AREAS

### Europe

These are characterized by thin covers over highly altered rocks and in the south may also be too highly folded to provide much chance of important deposits. The great oil-shale deposits of Esthonia suggest that Lower Paleozoic rocks may yield important reserves. (p. 84).

### Asia

Scattered patches of Paleozoic sediments between folded areas in China are so little known that their possibilities cannot be appraised at this time. (p. 85).

### Mexico and the Caribbean

The distinction between these areas and the fragmental areas mentioned (p. 83) is more or less arbitrary. It is based upon relative thinness of cover, present interest and rejection by other geologists in the past. There are, however, good possibilities for small production and these areas may provide an occasional large field.

The Bahamas are a part of a coastal plain which lies on the outer flank of the Greater Antilles. They may be considered a part of Florida and have very much the same chance of yielding oil.

### Canada

The thin sedimentary cover in the Arctic and in the area southwest of Hudson's Bay, their inaccessibility and our lack of knowledge of structure and of the occurrence of oil in these regions make them poor prospects. The same is true of the St. Lawrence lowlands. In portions of the mountainous area of British Columbia there are possibilities for production which are probably remote. (p. 88).

# EAST INDIES AND AUSTRALIA

AUSTRALIA and the East Indies, together with Oceania and other islands of the Pacific comprise a fractured continent and the ends of two great mountain chains. The first of these chains represents the east end of the series of flooded mountains which begins in the Atlas, passes through the Zagreb Mountains, the Himalayas and the Burmese arc. It passes through Sumatra, Java and the smaller islands of the east to near New Guinea where it turns sharply north, then west and ends in Ceram where it is hemmed in by the ends of the Asiatic island festoons. These latter arcs may be considered a part of the great Andes chain which continues into Alaska and then down the coast of Asia where in the Philippines, it breaks into a shelf splaying out from Borneo to Halmahera, east of Celebes.

The continent of Australia consists of a central shield, the eastern extremity of Gondwanaland, in western Australia. The Australian Alps, including part of southern New Guinea, form an arc which occupies an old Paleozoic trough flanking the shield. They are, thus, analogous to the Appalachians. Behind them is a depression formed during the Mesozoic and early Tertiary.

Tasmania and Central New Guinea lie on an outer arc, while New Zealand and the other islands of Polynesia form two series of arcs of which one series is concentric with the Australian Alps and the other extends to the northeast through Fiji.

The eastern limits of the old Australian continent are unknown. Some Cretaceous deposits in New Zealand have such close affinities with those of Chile that some geologists consider that the two areas were connected. Opinion is general, however, that the Pacific has always been an ocean and that any connection across was by way of Antarctica. If true, that continent may have oil possibilities south of the Pacific.

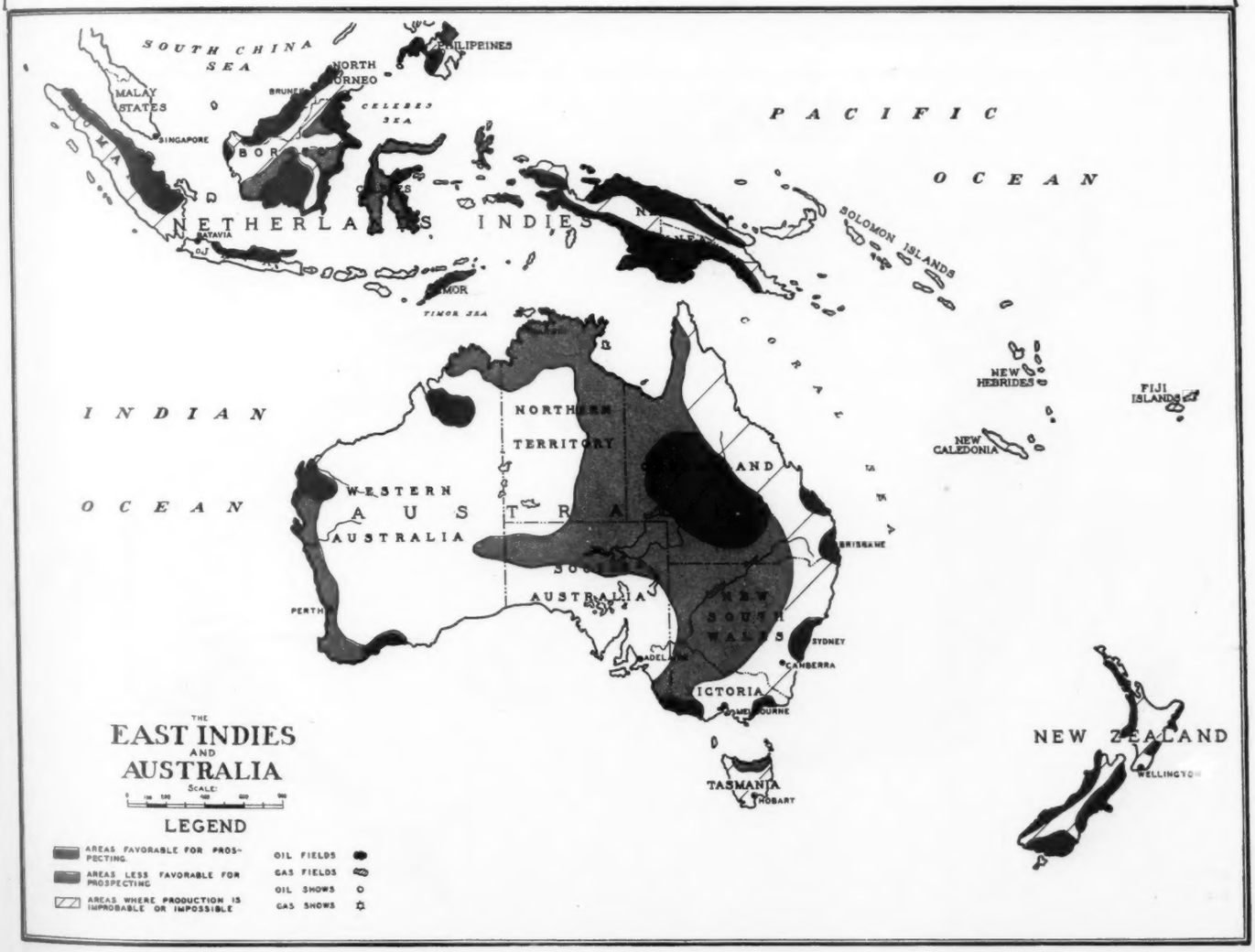
### Areas Favorable for Prospecting

The fields of the Netherlands East Indies differ from the other major fields associated with the southern looped chains of the Alpine-Himalaya systems in that they are situated in the backland rather than the foreland. The only remaining portions of the foreland are in Timor and Ceram. The fields now producing are of the California type and their area is small compared with that of the region where oil is likely to be found. Although associated with a different type of mountain-building, the fields of Borneo are of the same type and this large island has been prospected only along the coast while similar island groups, the Philippines, Celebes, Halmahera and others are untouched.

The Australian continent and associated island arcs have much fewer possibilities. Many attempts have been made to find oil in Australia without much success, although a few shows keep activity going. The best possibilities are in downfaulted marginal blocks and in the depression between the shield and the Australian Alps.

In the other arcs, the only possibilities appear to be in those traversing New Zealand and New Guinea. Here selvages of sedimentary rocks flanking the mountains have many indications of oil but no important production has been obtained.

The other islands are either folded masses of igneous rocks, volcanoes or coral islands surmounting the other two types and, as such, offer practically no possibilities of production.



# DOMINION OF CANADA

CANADA is built around a central shield which consists of rocks of pre-Cambrian age. This shield is exposed in an area of over 2,000,000 sq. miles and extends to Greenland in the east and into the Lake Superior region and the Adirondacks in the United States. During the Paleozoic, the margins of this shield sank below sea level and on the sunken margins were deposited rocks of different ages. These were mostly limestones of Ordovician, Silurian and Devonian age in Canada, with Cambrian sands at the bottom of the series in Quebec. Mississippian and Pennsylvanian rocks were laid down in the Maritime Provinces and the plains area. During the Mesozoic, the only area to be submerged was the plains area.

West of the Great Plains the geology was complex with deep troughs filled with sediment of different ages which were later thrown into mountain ranges and the whole was subjected to great intrusions of igneous rocks.

### Favorable Areas for Prospecting

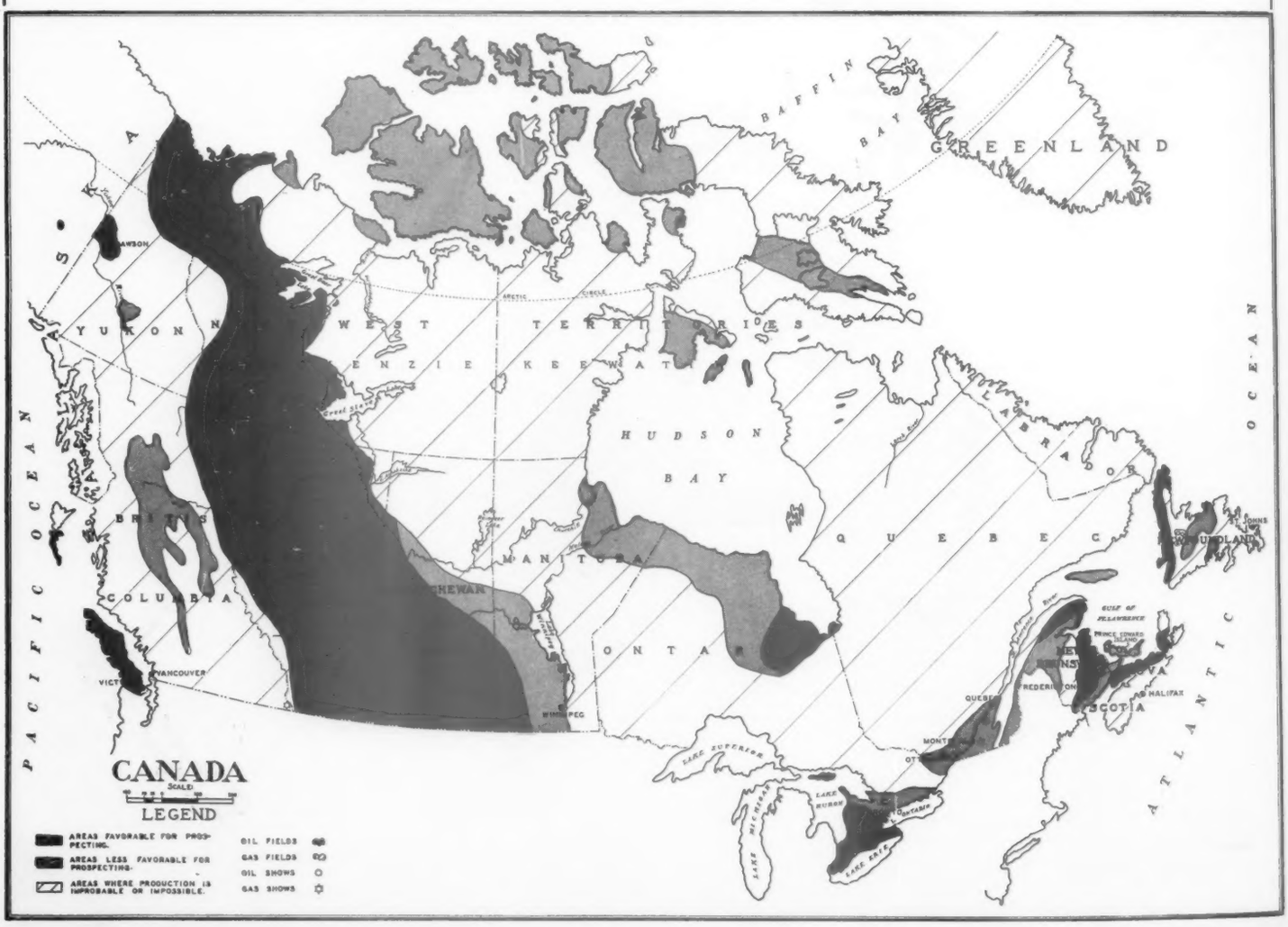
The area offering the best possibilities for production is the plains region or the valleys of the Mackenzie and Saskatchewan rivers. Flat structures of the same type as found in northern Montana extend into the regions and many of these structures have produced gas, mainly in rocks of Cretaceous age. Along the Rocky Mountain front, Mississippian limestones have produced at Turner Valley but structures are complicated by sharp folding and faulting with strong overthrusts from the mountains onto the plain.

In the valley of the Mackenzie and its principal tributaries, conditions change. Paralleling the mountains and the river are broad folds which afford excellent prospective structural trends and a small field at Fort Norman near the mouth of Great Bear Lake shows that commercial production is possible. The greatest known occurrence of petroleum is in the tar sands of the Athabaska River where oil, estimated at from 100,000,000,000 to 200,000,000,000 bbl. impregnates a Cretaceous sand which immediately overlies the Devonian limestone and outcrops at the surface.

Southern Alberta may be considered to be in the same stage of development as Central Montana and the remainder of the area is virtually untouched. Possibilities range from the present small production to an output comparable to that of the Mid-Continent.

In Ontario, the southern peninsula resembles Michigan superimposed on western Ohio so far as producing horizons are concerned but production both of oil and gas is not large and, as the area has been prospected for more than 80 years, there is not much possibility of a great increase.

In Gaspe there is a wedge-shaped area which is known to contain oil but many wells have been drilled without commercial success. The central plain of New Brunswick contains shallow production both of oil and gas and there are extensive deposits of oil shale in the Mississippian. The older Paleozoic rocks to the north and south are highly folded and this condition may render deep drilling useless. In Nova Scotia and Newfoundland, long narrow valleys of Pennsylvanian rocks afford some possibilities for production and seeps of oil and gas are common. It is possible, however, that the area resembles that part of Pennsylvania where there has been so much folding and faulting that the occurrence of oil in commercial quantities is impossible. The only Permian rocks exposed in this area are in Prince Edward Island where wells over 5,000 ft. deep have stopped still in red beds. West of the cordilleran region, there are possibilities for production on Vancouver and Graham islands. They have not been considered to any extent, however, and development, if any, will probably await the discovery of oil in the more favorable Puget Sound district in the United States.



# Capacity of Uruguayan Refinery Increased 25 Per Cent

By ENG. ERNESTO S. PELUFO
Superintendent ANCAP Refinery

*Carlos de Castro, above, president of ANCAP; Eng. Carlos R. Vegh Garzon, center, general manager of ANCAP, and Eng. Ernesto S. Pelufo, ANCAP refinery superintendent*

MONTEVIDEO, Uruguay. — Improvement in the quality of products derived at Uruguay's only refinery near this city and increase in the volume of crude processed resulted this year from operation of the catalytic-polymerization plant and changes in the arrangement of heat exchangers and charging pumps.

The ANCAP refinery, which was commissioned in January 1937 with a capacity of 5,000 bbl. daily, was equipped with facilities during 1941 that raised throughput to 6,300 bbl. per day. The increase in capacity was accomplished by installation of a heat exchanger between the crude line and the fuel-oil line running from the cracking plant to the storage tanks and a few changes in the charge and residue pumps.

The catalytic-polymerization plant, which went on stream in December 1940, was in operation throughout the current year. About 10,000 cu. ft. of gas per hour, produced from the Dubbs stabilizer reflux accumulator, having a content of 35 per cent $C_3$-$C_4$ olefins, is mixed with 8,000 to 10,000 cu. ft. of recycling gases and compressed.

Compressed gases are heated to 370°-390° F. in a simple pipe-coil heater and passed through two catalyst towers filled with special "solid" phosphoric acid. Polymerization of olefins in $C_3$-$C_7$-$C_8$ compounds raises the temperature which must be maintained at 470°-480° F. Polymer and gases cooled at 175° F. are stabilized in a tower at a pressure of 280 lb. per sq. in. with reboiler at 275° F. and head at 105° F.

About 100 gal. of polymerized gasoline, having 30 lb. R.v.p., is mixed per hour with 1,650 gal. of cracked gasoline in the lines leading to storage. Blending increases the octane rating of cracked gasoline about one number.

Catalyst must be removed from the towers every 4 months. Average production is 40 gal. of polymer gasoline per pound of catalyst. Gasoline production in 10½ months amounted to 9,139 bbl., reformed to 10 lb. R.v.p.

Cracked gasoline can be treated in liquid phase in Gray towers. Sometimes the gasoline from cracking is sent to the treating plant direct from the stabilizer tower, in which case, after treatment with soda and doctor solution, it is inhibited with about 0.010-0.012 per cent inhibitor solution No. 4.

In order to control quality of production, ANCAP'S refinery is equipped with a modern laboratory which is fitted with several apparatus and instruments for investigation purposes, such as the Podbielniak and the Gockel apparatus, the C.F.R. octane-rating motor, etc.

During the past 12 months of operation, the refinery charged 2,046,000 bbl. of crude, an average rate of 5,605 bbl. daily. Refinery charge included 1,553,000 bbl. of Peruvian and Ecuadorian paraffin-base stock and 493,000 bbl. of Temblador (Venezuela) crude. The Temblador crude (21.8° A.P.I.) was only processed in the topping unit, yielding 70 per cent bottom residual fuel oil with viscosity of 140 Saybolt Furol seconds.

Forty per cent of the bottoms from the light paraffin-base topped crude was charged to the cracking unit which produced 50 per cent gasoline and 42 per cent fuel oil.

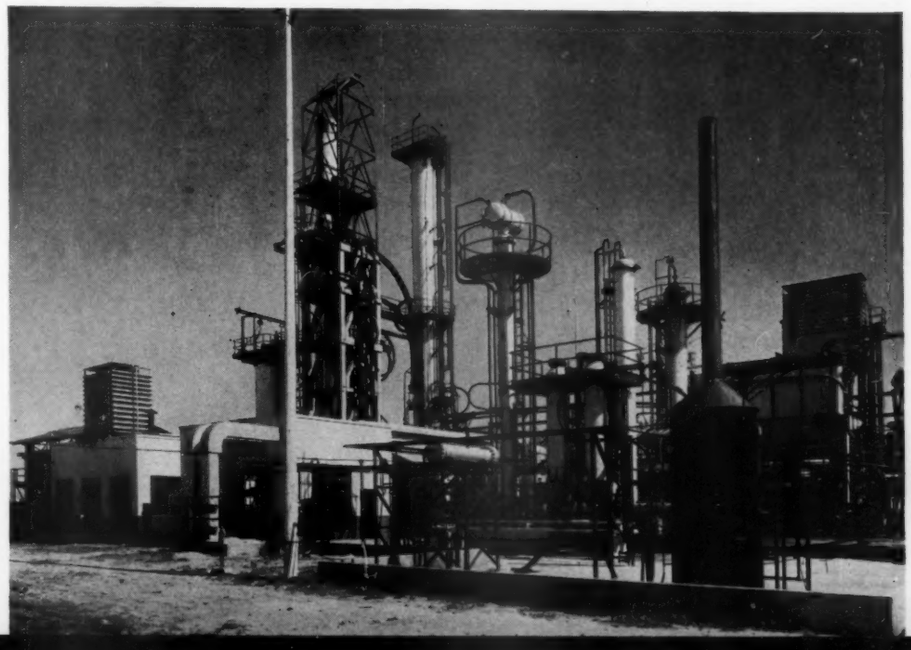
Cracking capacity is 2,000 bbl. daily of reduced crude stored in thermal-insulated tanks located in the topping plant. Cracking throughput for the last 12 months was 650,000 bbl.

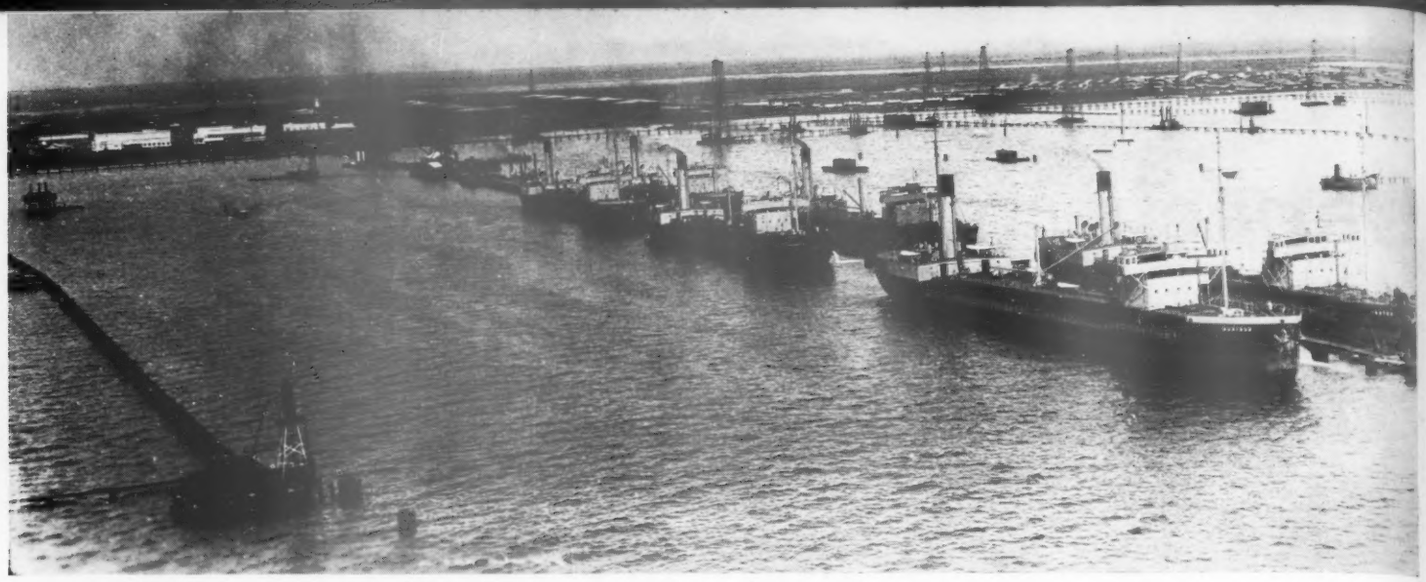
Production from the topping and cracking operations during the past year included:

| Product— | Barrels |
|---|---|
| Aviation gasoline (73 octane from Temblador crude—4 per cent) | 11,500 |
| 65-octane motor gasoline | 747,000 |
| Mineral turpentine (300°-385° F.) | 4,000 |
| Kerosene (525° F. e.p.) | 338,000 |
| Gas oil (680° F. e.p.) | 205,000 |
| Fuel oil (125 sec. S.F. at 122° F.) | 592,000 |
| Total | 1,897,500 |

The ANCAP refinery is in Montevideo Bay, about 5 miles from the city. The plant-storage capacity amounts to about 1,500,000 bbl. The refinery is served with a railway branch and the company has its own piers in Montevideo Bay.

*Cracking section and recently added polymerization plant at ANCAP's refinery*





*Tankers loading oil at one of the docks in Lake Maracaibo where current production of nearly 450,000 bbl. per day is mostly moved by this fleet of boats to refineries at Aruba, Curacao and elsewhere*

# Venezuela's Oil Industry Exceeding Prewar Output

By LUIS HERRERA FIGUEREDO
Chief Petroleum Inspector, Ministry of Fomento

**Crude-oil production from Venezuela this year totaled around 220,000,000 bbl., the highest rate of output in the history of the country. Jusepin, San Joaquin, Roble, Santa Ana, Leona and Oficina, all fields in the eastern part of Venezuela, were the chief contributors to the new record in recovery. Tia Juana increased its output 20 per cent.**

CARACAS, Venezuela. — Position of Venezuela as an oil-producing country has improved notably since the start of this year. It is already known that on account of the succession of international events that took place in the second quarter of 1940 the daily rate of production in Venezuela fell from 92,203 metric tons (618,035 bbl.) in June 1940, to 63,414 tons (425,065 bbl.) in December of the same year. In January 1941, production reacted up to the 73,037 metric-ton level (489,565 bbl.), and from then on the daily production rate has increased almost constantly reaching 101,604 tons (681,050 bbl.) per day in October, as can be appreciated through the following table:

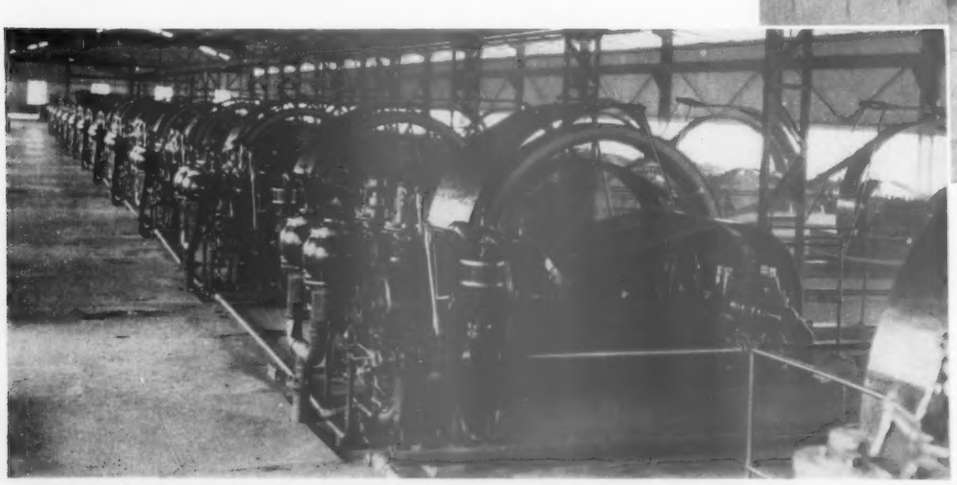
| 1941— | Metric tons daily | Barrels daily (at 6.708 bbl. per ton) |
|---|---|---|
| January | 73,037 | 489,565 |
| February | 79,180 | 530,745 |
| March | 77,165 | 517,235 |
| April | 81,057 | 543,325 |
| May | 89,413 | 599,335 |
| June | 93,702 | 628,085 |
| July | 91,278 | 611,835 |
| August | 94,055 | 630,450 |
| September | 96,781 | 648,725 |
| October | 101,604 | 681,050 |
| Daily average (10 months) | 87,727 | 588,035 |

According to 1940 final figures, Venezuela, with the exception of Iraq and the Netherlands East Indies, was most affected by the changed international situation among the important producing countries. This year, judging by the data already on hand, the situation would appear to be just the opposite, since Venezuela, with the possible exception of the Soviet Union, seems to be the high-ranking oil-producing country whose final figures will show the most substantial gain over last year.

## Production and Exports

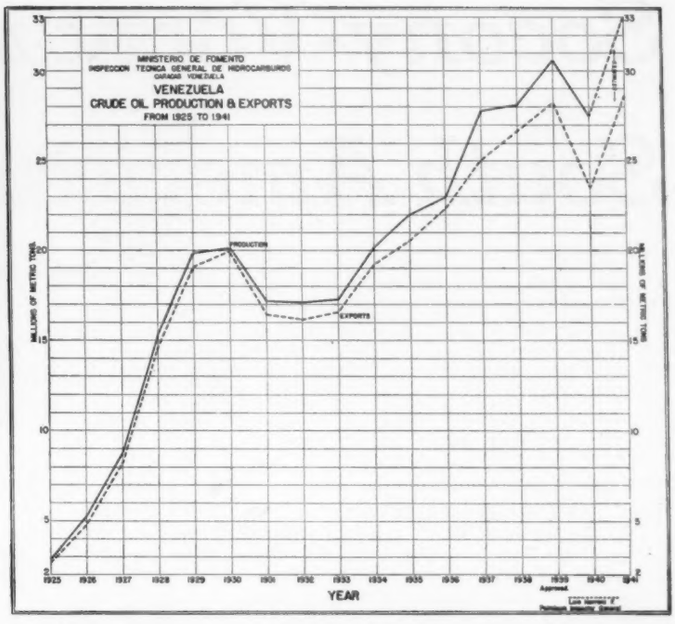
Total oil production in Venezuela during 1941 can be estimated to be—if no unforeseen development takes place before the end of the year—above the 220,000,000-bbl. mark, an average of 602,740 bbl. This figure shows an increase of nearly 33,000,000 bbl. over 1940 production, or 15 per cent, and constitutes a new record for the Venezuelan oil industry.

The distribution of such a notable increase among the producing fields can be partly observed through the accompanying table, wherein individual production totals for the period Janu-



*Interior and exterior views of Caribbean Petroleum Co.'s compressor plant in the Mene Grande field, a short distance east of Lake Maracaibo*

*Concrete wall to protect lake shore at Lagunillas*




*Venezuela's production and export curves moved to new highs this year*

ary-September in 1940 and 1941 are compared.

Crude-oil exports during the present year are expected to be in the neighborhood of 194,000,000 bbl., 531,505 bbl. daily, while exports of refined products, it is estimated, will total some 25,000,000 bbl., 68,495 bbl. daily.

## Four New Fields Opened

Four new fields are being developed during 1941 in eastern Venezuela.

1. At Santa Barbara, in northern Monagas, southwest of the Jusepin field, where the Compania Consolidada de Petroleo (Consolidated Oil Corp.) initiated active operations the preceding year, two wells had been completed up to October 1. Production tests on Santa Barbara wells averaged 1,200 bbl. daily of 30°-32° A.P.I. gravity oil. Drilling is under way at two other locations in this area.

2. Northeast of the big Oficina field, the Mene Grande Oil Co. has continued intensive drilling operations in the Leona region, where eight wells so far have been completed. The wells completed at Leona have produced an average of 1,100 bbl. daily in their output tests. Gravity ranges from 26° to 30° A.P.I.

The big 16-in. pipe line laid between Oficina and Mene Grande's export terminal at Guaraguao will provide an outlet for the crude produced in this area, as soon as the secondary line is completed that the company is to build between Oficina and Leona.

3. At Santa Rosa, east of the El Roble field, the Mene Grande is developing a promising new structure. One well has been completed here—capable of producing 1,800 bbl. daily of a 42° A.P.I. oil—and drilling proceeds at two other locations.

4. In the concessions adjoining Santa Rosa and El Roble, at Guario, the Socony-Vacuum Oil Co. has completed two producing wells this year. The gravity of the oil encountered at Guario ranges from 39° to 48° A.P.I., and the average production registered in the tests carried out on the wells before mentioned amounted to 1,150 bbl. per day. The company is drilling two other locations at this site.

## Wildcatting Operations

Wildcatting operations have not been specially active in the present year. Of the five wells spudded during 1941 in eastern Venezuela, three have been already abandoned (Socony 1 Hamaca and 1 Panchita, in southern Anzoategui; and Standard 1 Mulata, west of Santa Barbara field). The remaining two, Socony 1 Anaco, near El Roble field, and Mene Grande 1 Quiamare, which is the northernmost well located up to now in the State of Anzoategui, are still drilling at 10,500 ft. and 8,400 ft., respectively.

In the State of Guarico, Sociedad Anonima Petrolera Las Mercedes well 1 Mercedes has found substantial oil showings. Though not formally tested as yet, this wildcat promises to be the first commercial producer located in Central Venezuela, between two established producing areas.

In the western part of the country, about 40 kilometers northwest of Maracaibo, the Orinoco Oil Co. resumed operations by drilling 3 Netick. Latest reports indicate that this wildcat will be abandoned.

## VENEZUELA PRODUCTION BY FIELDS AND COMPANIES

| Company— | Field— | Production, Jan.-Sept. 1940 (Metric tons) | Production, Jan.-Sept. 1940 (Barrels) | Production, Jan.-Sept. 1941 (Metric tons) | Production, Jan.-Sept. 1941 (Barrels) | Per cent increase or decrease in 1941 over 1940 |
|---|---|---|---|---|---|---|
| Venezuelan Oil Con., Ltd., Lago Petroleum Corp. and Mene Grande Oil Co., C.A. | Lagunillas | 7,289,807 | 48,353,290 | 7,104,060 | 47,121,230 | —2.5 |
| Venezuelan Oil Con., Ltd., Lago Petroleum Corp. and Mene Grande Oil Co., C.A. | Tia Juana | 4,393,209 | 29,307,100 | 5,231,450 | 34,899,000 | +19.1 |
| Standard Oil Co., of Venezuela | Quiriquire | 2,449,596 | 16,456,385 | 2,330,229 | 15,654,480 | —4.9 |
| Venezuelan Oil Con., Ltd., Lago Petroleum Corp. and Mene Grande Oil Co., C.A. | Cabimas* | 2,236,248 | 15,369,730 | 2,405,301 | 16,531,635 | +7.6 |
| Mene Grande Oil Co., C.A. and Standard Oil Co. of Venezuela | Oficina | 1,420,821 | 10,346,420 | 2,464,339 | 17,945,315 | +73.4 |
| Caribbean Petroleum Co. | Mene Grande | 1,192,462 | 8,030,040 | 1,339,615 | 9,020,965 | +12.3 |
| Colon Development Co., Ltd. | El Cubo† | 662,235 | 4,814,450 | 655,580 | 4,766,065 | —1.0 |
| Lago Petroleum Corp., Standard Oil Co. of Venezuela and Mene Grande Oil Co., C.A. | Temblador | 435,508 | 2,974,085 | 364,833 | 2,491,445 | —16.2 |
| Standard Oil Co. of Venezuela | Jusepin | 424,568 | 3,097,225 | 619,595 | 4,519,945 | +45.9 |
| Standard Oil Co. of Venezuela | Pedernales | 201,201 | 1,369,375 | 175,625 | 1,195,305 | —12.7 |
| Venezuelan Oil Concessions, Ltd. | Bachaquero | 194,131 | 1,303,005 | 35,942 | 241,245 | —81.5 |
| Standard Oil Co. of Venezuela | Cumarebo | 172,289 | 1,384,685 | 180,188 | 1,448,170 | +4.6 |
| Mene Grande Oil Co., C.A. | San Joaquin | 87,306 | 672,695 | 253,283 | 1,951,545 | +190.1 |
| Venezuelan Oil Concessions, Ltd. | La Concepcion | 85,412 | 638,625 | 107,136 | 801,055 | +25.4 |
| Central Area Exploitation Co. | Hombre Pintado | 71,699 | 496,875 | 62,532 | 433,345 | —12.8 |
| Standard Oil Co. of Venezuela | El Roble | 49,388 | 387,595 | 154,114 | 1,209,485 | +212.0 |
| Venezuelan Oil Concessions, Ltd. | La Paz | 47,631 | 323,510 | 47,678 | 323,830 | +0.1 |
| British Controlled Oilfields, Ltd. | El Mene de Mauroa | 33,169 | 244,455 | 24,195 | 178,315 | —27.1 |
| Mene Grande Oil Co., C.A. | Santa Ana | 8,163 | 66,725 | 16,602 | 135,705 | +103.4 |
| Standard Oil Co. of Venezuela | Las Palmas | 4,969 | 36,125 | 2,491 | 18,110 | —49.9 |
| Texas Co. (Venezuela), Ltd. | Los Caritos | 1,931 | 14,040 | 1,119 | 8,135 | —42.1 |
| Mene Grande Oil Co., C.A. | Leona‡ | 1,308 | 9,300 | 6,491 | 46,150 | +396.3 |
| Standard Oil Co. of Venezuela | Socororo | 1,130 | 7,975 | 121 | 855 | —89.3 |
| Socony Vacuum Oil Co., Inc. | Guario | 690 | 5,265 | 11,245 | 85,810 | +1,529.7 |
| Standard Oil Co. of Venezuela | Tabasca | 134 | 925 | 509 | 3,510 | +279.9 |
| Mene Grande Oil Co., C.A. | Santa Rosa | (§) | ..... | 21,538 | 167,805 | ..... |
| Orinoco Oil Co. | Distrito Mara | (§) | ..... | 3,476 | 25,025 | ..... |
| Compania Consolidada de Petroleo | Santa Barbara | (§) | ..... | 3,126 | 22,725 | ..... |
| Texas Co. (Venezuela), Ltd. | Rincon Largo | (§) | ..... | 2,104 | 15,150 | ..... |
| Total | | 21,465,187 | 145,709,900 | 23,624,517 | 161,261,355 | +10.1 |

*Includes La Rosa, Ambrosio and Punta Benitez fields. †Includes Rio Tarra and Los Manueles fields. ‡Formerly called El Tigre. §Not producing.

# Socony-Vacuum Drills Deepest South American Well

By J. P. O'DONNELL

A NEW depth record for South America is believed to have been established this year by Socony-Vacuum Oil Co., C.A., 1 Anaco, in the State of Anzoategui, eastern Venezuela. This test was drilled to 11,294 ft., 10,673 ft. below sea level. More than 150 wells have been drilled below 11,000 ft. in the United States but few foreign operations have been carried to this depth so that the 1 Anaco is one of the deepest tests drilled outside this country.

The 1 Anaco is 15 miles northwest of Cantura and 15 miles northeast of Santa Ana. The nearest large city is Barcelona, 65 miles to the north. The location is 9 miles from the camp, which, in turn, is 65 miles south of Guanta, the port of supply. Material was moved in by truck and it required about 3 weeks to rig up. Drilling operations were in charge of O. B. Rylander and J. C. Massey, tool pusher (deceased), and American drillers were used. Venezuelan nationals comprised the balance of the crews.

### Purpose of the Test

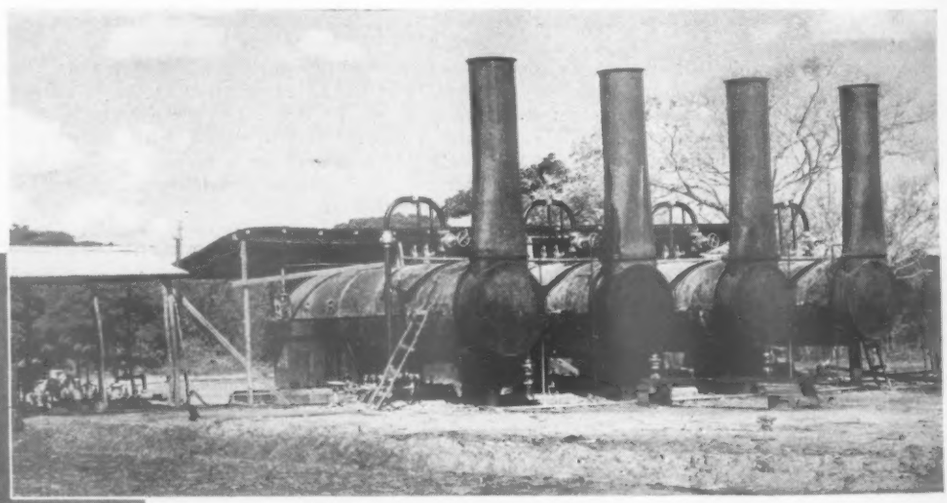
Purpose of the 1 Anaco was to explore a possible extension to the Roble field. The area was discovered by surface geology and later defined by seismograph. The location is on the northeast flank of a broad dome with gently dipping flanks. The dome is one of five structures which have a southwest-northeast trend and which extend over 25 miles. The terrain on which the test is located is flat and sandy with no distinctive features.

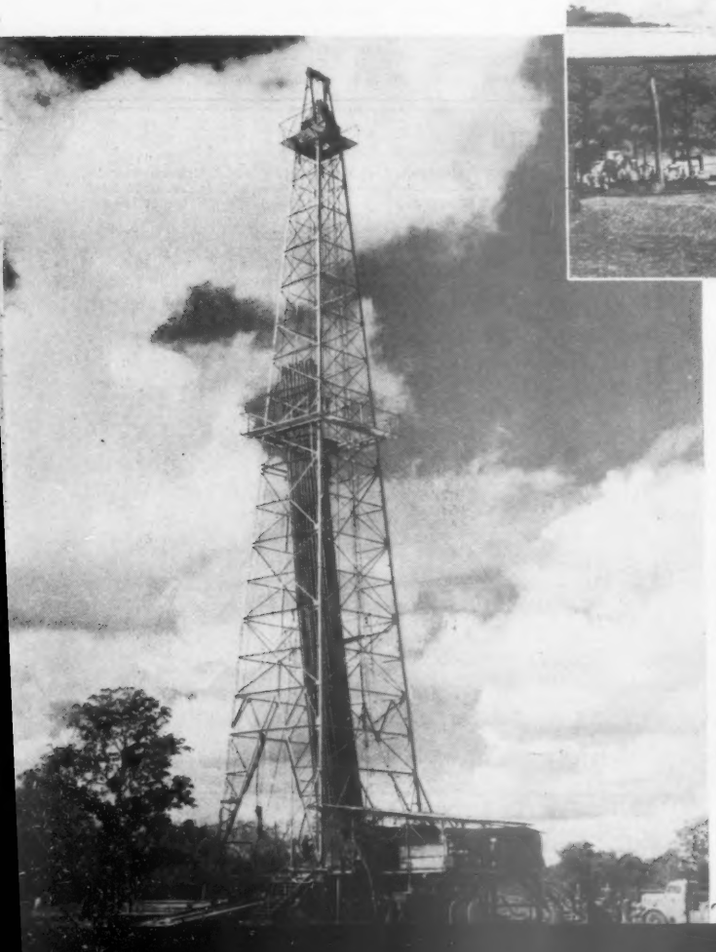
Formations penetrated were chiefly hard, black, brittle shales. The bottom 200 ft., however, consisted chiefly of hard, tight sand. The first oil sands were encountered around 8,550 ft. The more important markers and depths at which they were reached are the Trochimmina, at 3,425 ft., and the Bolivina MZ, at 7,120 ft., both of Miocene age. It is believed that the well reached the Eocene at 11,080 ft. The test indicates a northeast extension of the Noble structure but the productivity of the individual sands so far tested has not been conclusive.

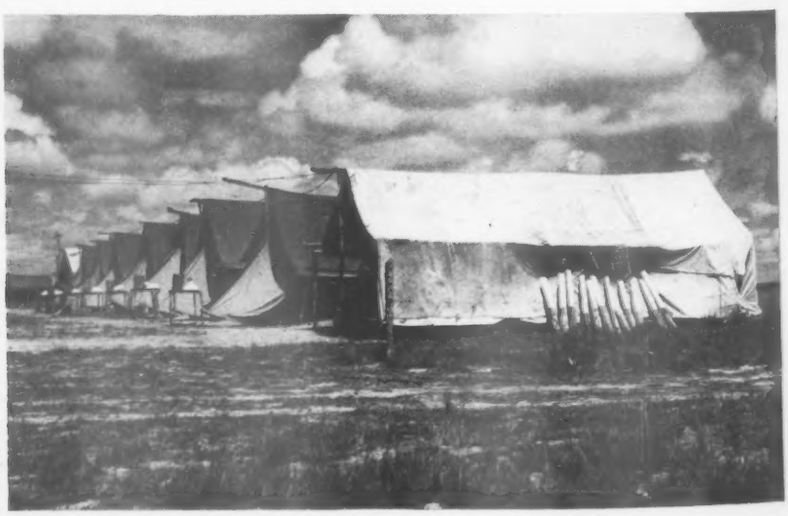
The well was drilled with a heavy-duty steam rig. Four 150-hp. domeless boilers with a working pressure of 350 lb. per sq. in. were used. They were equipped with automatic controls. The three-shaft four-speed draw works was powered by a 12 by 12-in. vertical steam engine. Two 18-in. steam pumps were used to a depth of 10,900 ft., while at greater depths a 20-in. pump was used for circulation. The 136-ft. steel derrick has a 30-ft. base and a 5-ft. 6-in. top and a capacity of 952,000 lb. It has three "V" windows. The 7-ft. steel substructure was set on a cement foundation. The traveling block was a five-sheave 76-in. type with a capacity of 300 tons. The six-sheave crown block has a capacity of 360 tons. The swivel was a Type B 6-in., with a static-load capacity of 1,000,000 lb. Heavy elevators with 2¾-in.-diameter links were used.

### Control Instruments

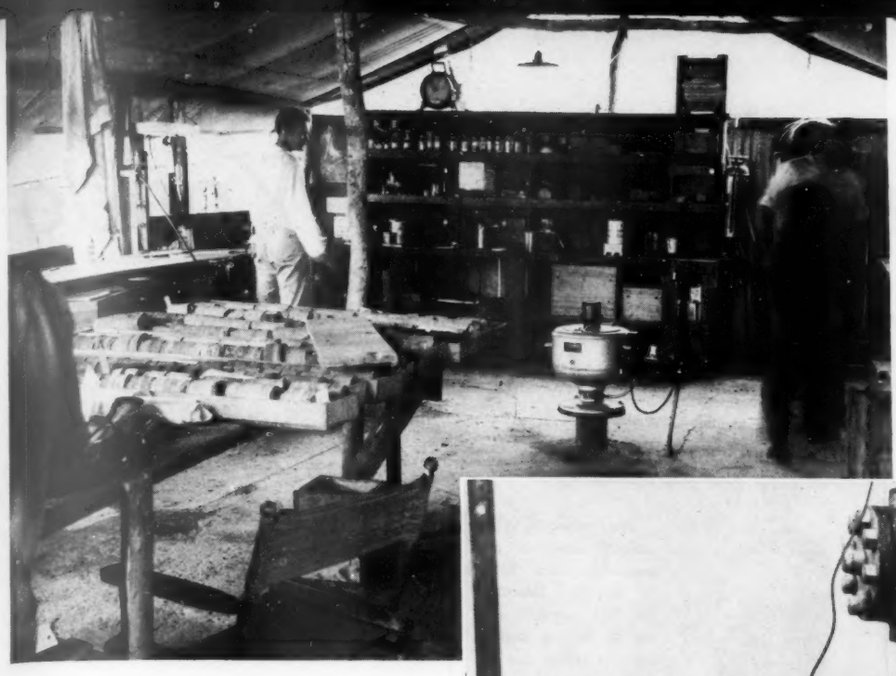
Control instruments included a diaphragm-type mud gage and a quintuplex indicator to show the weight on bottom, the load on the derrick, the slush-pump pressure, speed of the rotary table and the torque on the drill pipe. Viscosity of the mud fluid was determined by the A.P.I. Marsh

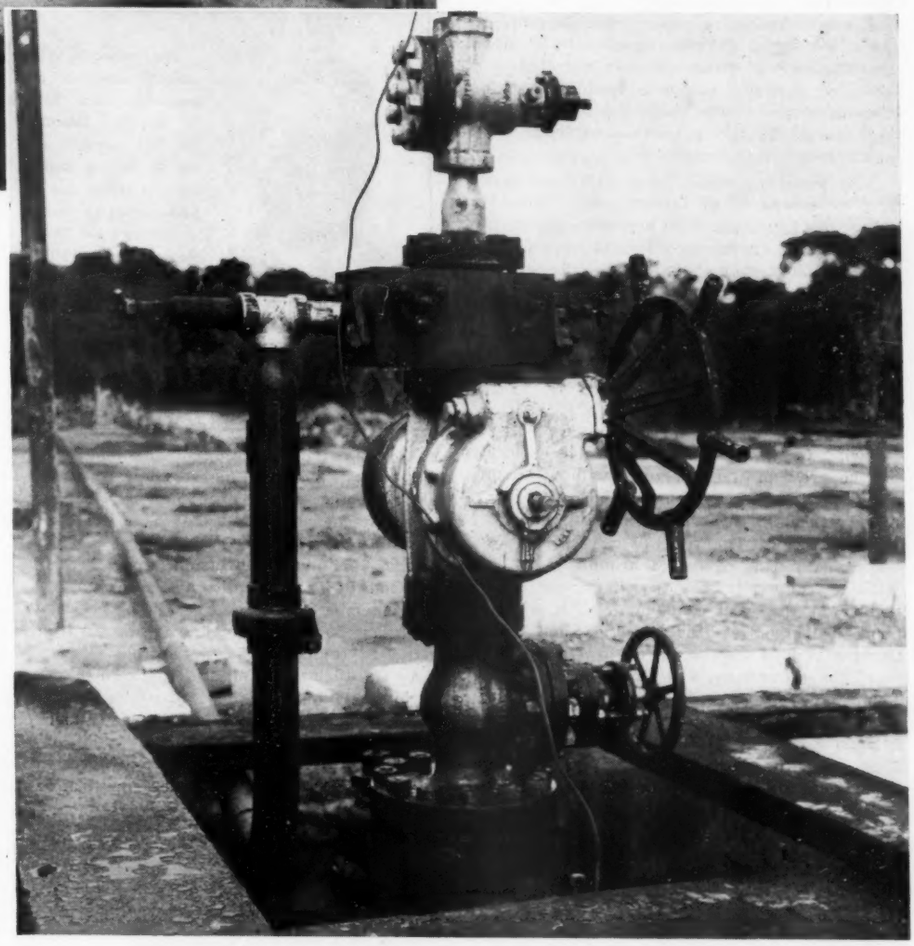






***Below: Site of South America's deepest well, showing derrick and general equipment pattern. Right: Arrangement of the boiler battery at the deep-well location. Right, below: Temporary camp used by seismograph crew operating in eastern Venezuela***





*Above: Interior view of the field laboratory for analysis of cores. Right: Surface connections on eastern Venezuela producing well*

funnel method and the weight by a hydrometer. Depths were recorded at hourly intervals by the driller.

The surface hole was drilled with 6⅝-in. internal upset 25-lb. drill pipe, the intermediate hole with 5⅝-in. 22-lb. internal-upset drill pipe, and the final hole with 4½-in. 16.6-lb. internal-upset drill pipe. Threads on the 6⅝-in. pipe were A.P.I. regular while the other two strings had A.P.I. full hole. A varied number of drill collars were used throughout the hole, the maximum being 123 ft. in the 8½-in. hole. The drill collars were coupled with double pin subs. Rubber protectors were used, one for each stand of drill pipe in the casing. No stabilizers or reamers were used.

### Rotary Table Speeds

Rotary table speeds varied from 175 r.p.m. for surface drilling to 50 r.p.m. for deepest drilling with changes being made according to the formations encountered. The average speed was approximately 100 r.p.m. Weight on the bit varied from 3,000 to 9,600 lb., and, like the rotary speed, was governed by the character of the formations, which were largely shales and some sand. Some of the shales included hard siderite streaks. One hundred and fifty-one bits where used: 77 rock bits, 71 hard formation coreheads and 3 drag bits.

The 17½-in. surface hole was drilled full size to a depth of 1,881 ft. A total of 1,865 ft. of 13⅜-in. 68.1-lb. screw-type casing was run and cemented by inside displacement. The cement, 1,520 sacks, was run through a float collar. Four days were allowed for setting. Control connections installed included a 13⅝-in. pressure-operated blowout preventer and a 13⅜-in. control gate with blind rams. A high-test separator is the only surface-control equipment in use.

Water was used to start the hole and mud was made from formation. A standard hookup with stop cocks on the kelly and standpipe was used throughout the drilling of the test. The mud system consisted of two 35 by 15 by 7-ft. pits, a shale shaker and a 120-ft. steel mud ditch. The mud lines were 4-in. and the rotary hose was 3-in. i.d. Circulation was lost three times, when drilling at 8,065, 8,150, and 11,167 ft., and returns were diminished several times. Circulation was regained in each instance by conditioning the mud. Regenerated cellulose fiber was used in the latter two instances.

The drill pipe was never stuck, but there were two twistoffs from 900 to 910 ft., the causes of which are still under discussion. Both times the fish were recovered with overshot, the first requiring about 14 hours and the latter, 5 hours. Successful use of the overshot obviated either cutting-out or washing-over jobs. The total time from spudding in to the final depth was 246 days, but actual drilling time, of course, was somewhat less. The best time was made in the upper 3,000 ft.

Cores were taken at nine points: From 6,900 to 7,547 ft.; from 7,750 to 7,880 ft.; from 8,515 to 8,604 ft.; from 9,560 to 9,805 ft.; from 9,850 to 9,900 ft.; from 10,130 to 10,260 ft.; from 10,415 to 10,983 ft.; from 11.064 to 11,073 ft.; and from 11,190 to 11,192 ft. Altogether 138 cores were taken and the total recovery amounted to 979 ft. Cores of oil-bearing sands were analyzed in the field laboratory. Most of the coring to 7,500 ft. was done with a wire-line barrel, while all except two at greater depths were taken conventionally. Three 2,500-ft. 1⅛-in. wire lines were used in drilling the wells.

The intermediate casing string was run to 6,116 ft. It was made up of 9⅝-in. o.d. 47.6-lb. J-55 type casing with long threads and couplings and was set in a 12¼-in. hole. The oil string was 6-in. o.d., 20-lb. per ft., N-80 casing with long threads and couplings. It was set at 11,287 ft. In the intermediate string 750 sacks of heat-resistant cement were placed down through the casing. The time required for mixing and displacing was 91 minutes. The slurry weight was 16.1 lb. per gallon. The 6-in. string was cemented regularly with 775 sacks of heat-resistant cement and an additional 458 sacks were pumped in the annulus. Slurry weights were 16.2 lb. per gal. in each of the latter jobs.

At the time of writing, the well is in the process of being tested. Individual sands being tested are cased off and then gun-perforated.

**BITS USED PER 1,000 FT. IN 1 ANACO**

| Depth (ft.)— | Rock bits— No. | Rock bits— Size (in.) | Core heads— No. | Core heads— Size (in.) |
|---|---|---|---|---|
| 1,000 | 2 | 17½ | .. | .... |
| 2,000 | 3 | 17½ | .. | .... |
| | 1 | 12¼ | 1 | 12¼ |
| 3,000 | 3 | 12¼ | .. | .... |
| 4,000 | 4 | 12¼ | 2 | 12¼ |
| 5,000 | 4 | 12¼ | .. | .... |
| 6,000 | 9 | 12¼ | .. | .... |
| 7,000 | 10 | 8½ | 1 | 12¼ |
| | .. | .... | 2 | 8½ |
| 8,000 | 4 | 8½ | 17 | 8½ |
| 9,000 | 13 | 8½ | 5 | 8½ |
| 10,000 | 8 | 8½ | 15 | 8½ |
| 11,000 | 6 | 8½ | 27 | 8½ |
| 11,294 | 10 | 8½ | 1 | 8½ |

Note: Three 17½-in. drag bits were used in the first 1,000 ft.

# Shell's Discovery on Yondo Block Is Colombian Feature

By E. OSPINA-RACINES
Consulting Engineer

**The author is a petroleum engineer and economist now living in Bogota, Colombia. He has served with the Colombian Department of Mines and Petroleum which corresponds to the United States Bureau of Mines. He has attended engineering schools in both Colombia and the United States. He was a member of the Colombian consulate staff in New York City for several years, but 3 years ago returned to South America to resume his petroleum engineering career.**

BOGOTA, Colombia.—Discovery of a new field on the Yondo concession, near Barranca Bermeja, which is under exploration by Compania de Petroleo Shell de Colombia, is indicated on the basis of partially complete testing operations. This development was easily the year's outstanding feature in the petroleum exploration and exploitation of Colombia.

This year has been one of intensive wildcat activity compared to former years. The Shell companies have been most active during the year and the first encouraging results have been obtained while testing the 1 Casabe wildcat on the Yondo concession, near Barranca Bermeja where Tropical Oil Co.'s refinery is located. It is reported that the test indicated a potential of around 500 bbl. or more per day. The well was spudded in on March 12 and has been drilled to total depth of 7,150 ft., having encountered several oil horizons which are still under test.

Shell 2 Casabe, which is reported to be located on the crest of the structure, will be spudded shortly. The Shell company has obtained a renewal period to carry out exploratory work on this concession. The renewal calls for two test wells and a surface fee of around $8,000. The initial 3-year exploratory period expired on September 14 this year. Palagua No. 1, which is being drilled on contract by the Shell on the Obregon Arjona tract acquired by transfer from an affiliated company, was spudded November 20. This tract is adjacent to a large area of private oil land owned in fee by the Texas Co. The Palagua River separates the two properties. The Shell company is also planning to test in the Department of Magdalena and rig is ready for 1 El Doce. In the Llanos region, the Shell companies have large holdings and a complete drilling rig is called for in the contracts to be installed in the Llanos concessions by February 10, 1944, on one and May 29, 1945, on another concession.

The Richmond Petroleum Co. of Colombia (Standard Oil Co. of California) is very active and on September 12 spudded 1 Culimba on the Villamizar concession obtained by transfer from an affiliated company, Cia. de Petroleos Occidental S.A. The Richmond and affiliated companies have various holdings in the Department of Magdalena, also a 247,000-acre concession under contract in the Llanos, where a drilling rig is to be installed by December 26, 1944. Richmond has a geophysical crew doing considerable work in the Llanos.

The Socony-Vacuum affiliate, Cia. de Petroleo del Carare spudded 1 McCarthy on November 23. This test is located on the east bank of the Magdalena, across the river from the Richmond 1 Culimba and north of the De Mares property. The affiliate Cia. de Petroleos del Valle del Magdalena spudded 1 Cimitarra on April 15 and during the middle of July the well had reached 1,495 ft., having encountered the basement rock rock at 1,091 ft. Some showings of heavy oil were obtained. A second test on this concession, which is located north of the Yondo tract where Shell 1 Casabe is being drilled, is scheduled for next year.

Tropical Oil Co. acquired the Gutierrez concession by transfer. This tract lies between the Yondo Shell property and the Socony affiliate concession. During the last week of October it had set 6⅝-in. casing at 7,800 ft., the top of the Cretaceous having been encountered at 5,861 ft. No showings are reported.

## Several Wildcats Drilling

On October 1 the following wildcats were reported drilling on the Barco concession: Petrolea No. 99 at 1,395 ft.; 1 Sardinata at 4,717 ft. tested for 150 bbl. per day; 1 Socuavo, which is the deepest test of the Barco, had reached 9,850 ft.; A-2 Tres Bocas was drilling at 4,577 ft.

Since 1937, 20 wildcat wells have been completed of which only one has shown any promising results. Shell 1 Casabe, on the west bank of the Magdalena River, is the best prospect. Practically all the wildcats drilled in Colombia have been and continue to be surveyed electrically. The figures on wildcatting in the country indicate that the chances of success in Colom-

*Transportation through the swampy sections of Colombia, covered with dense jungle foliage, constitutes one of the hardships of operations*

*Tanker loading at Covenas, terminal of the pipe line serving the Barco concession*

bia are not more favorable than in the United States.

Crude-oil production in Colombia is obtained from the Infantas and La Cira anticlines in the De Mares concession and from the Petrolea structure in the Barco concession. During the first 9 months of 1941 crude-oil production has experienced a 9 per cent drop compared to the corresponding period of 1940. The production figures are shown in Table 3.

The crude-oil production decline is explained in part by the fact that the three producing fields mentioned have been completely drilled and delimited. According to a report of the Ministry of Mines and Petroleum, no drilling has taken place on the Infantas structure since 1932. The latter now yields about 18 per cent of the De Mares concession production. La Cira structure has been completely drilled and delimited. No drilling has taken place since April of this year. This field yields the balance or 82 per cent of the 21,000,000 bbl. which are produced yearly by the De Mares concession.

### La Cira Structure Has 681 Wells

On the Infantas structure, 470 wells have been drilled, and on the La Cira, 681. In the Infantas field, 295 wells are on the pump and three are flowing. In La Cira, 460 wells are on the pump and 52 were flowing as of July 1 this year. Besides these, five other wells have been drilled as the Barco concession 181 wells have been drilled. Of these, 163 are on the Petrolea structure, 17 in the Rio de Oro field, and the balance as follows: Leoncito 1 Tres Bocas, 1 and 2-A Socuavo 1, Sardinata 1. As of July 1, four wells in Petrolea were on the pump and 86 were flowing. The average monthly production, taken from Table 3, of the Petrolea field during 1941 has been 318,000 bbl. From the 90 producing wells the daily yield averages 118 bbl. per well. This average compares to around 69 bbl. per well per day in the De Mares concession taking into consideration only the producing wells. Unless new fields are discovered on these concessions or in outside areas, oil production of Colombia may be expected to continue to decline.

The oil industry of Colombia comprises about 35 organized companies which are spending and investing large sums in exploration. Just in salaries and wages the total outlay of the industry during 1940 amounted to 17,053,594 pesos, the equivalent to about $10,000,000. Of this sum, 75 per cent was paid to nationals and 25 per cent to foreign staff personnel. Besides these expenditures, the financial resources which are necessary to carry out wildcat exploratory drilling may be appreciated upon considering that a drilling program in the upper Magdalena Valley called for an investment of $896,000 and that on four national concessions $4,290,000 were invested, three of the tracts having been surrendered to the Government after having been found barren of oil. Besides these financial burdens during 1939, the oil industry contributed 18 per cent of the government revenues in tax payments. This amounted to 39 cents per barrel exploited during the year. In addition to contributing to the central government's exchequer, the departments also receive a share of the oil industry's contributions. The Department of Santander, where the De Mares concession is located, obtained an income during 1940 amounting to 4,732,985 pesos, of which 1,165,997 pesos, or 25 per cent, was obtained as oil-royalty payments. The intimate economic tie of the oil industry to the national economy is apparent.

### Sixth of Acreage Favorable

The total area of Colombia comprises 448,741 sq. miles, of which the author has estimated that 73,028, or 16.3 per cent, may be classified as prospective oil land. This area is equivalent to 18,975,000 hectares, or 46,700,000 acres. The prospective oil land of the country is located in five distinct geographical districts and the respective area is given in Table 1.

As may be observed from the data of Table 1, 52 per cent of the prospective oil area of the country lies east of the eastern cordillera of the Andes Range. An export outlet on the Caribbean for this region would call for a pipe line not less than 750 miles in length, which at the same time would have to scale the cordillera from 8,000 to 9,000 ft. above sea level, although there is a pass at the southern part of the range which is only 6,700 ft. above sea level which, if used, would call for a much longer pipe line.

The proved oil area indicated in Table 1 corresponds to the De Mares concession in the Magdalena Valley and the Barco concession in the Catatumbo region. The first well was drilled on the De Mares property about 25 years ago, whereas on the Barco this took place 8 years ago. Oil land in these two concessions has been proven at the rate of 600 acres per year for the De Mares and 750 acres per year for the Barco. Compared to the rate in the United States, taking the figures of Arnold for proved oil land from 1859 to 1929 of 7,037 sq. miles, the ratio between Colombia and the United States is 1 : 100, which may serve as an index as to the difficulties which must be overcome in developing oil properties in South America.

### Oil Land Under Lease

Table 2 shows the statistics covering the prospective oil land. According to the total, No. 8, approximately 7,000,000 acres have been earmarked up to the present, which represents only 15 per cent of the prospective oil area indicated in Table 1.

It is of interest to note that the total area of national land under contract is 3,690,000 acres, whereas private land owned in fee or leased totals 3,310,000. Although 20 wildcats have been drilled outside of the two commercial operating concessions since 1937 and a total of 1,332 wells have been drilled on the De Mares and Barco properties, no drilling has taken place on private oil lands due to a legal situation which has paralyzed this activity. This situation is explained by the provision of the two basic oil laws, Law 37 of 1931 and Law 160 of 1936. According to these, in order to drill on private oil land proofs or titles showing that the land left the patrimony of the nation prior to October 28, 1873, must be presented. The ministry in view of these documents and opinions of the attorney general and the Petroleum Advisory Board may decide administratively if such private land carries the subsoil rights. If there is any doubt, and only one case is known to the contrary, the whole matter must be reviewed by the Supreme Court in a brief and summary process.

Cases are on record where this decision has been pending 3 or more year and still has not been decided. However, since the process is a summary one, the decision may be contested by either party by an ordinary process which takes not less than 5 years before it is decided. In addition, the government argues that it is morally obliged to contest all decisions which are adverse to the nation. The consequence is that no operator dares to drill a wildcat on private oil property until it is clearly established who is the owner of the oil which may be found. There are now more than 10 cases before the Supreme Court awaiting the summary decision. This legal situation could be cleared up by a broader interpretation of the laws in force or by a statute providing for recognition of subsoil rights by the same proofs which are admitted for surface rights according to Law 200 of 1936. Until such amendment of the oil law is made, it is unlikely that any important wildcatting on private land will take place in Colombia.

**TABLE 1—LAND CLASSIFICATION OF COLOMBIA—PROSPECTIVE OIL LAND**

| District— | Percentage | Sq. miles | Proved oil area |
|---|---|---|---|
| Magdalena | 19 | 13,950 | 15,000 |
| Catatumbo | 2 | 1,158 | 6,000 |
| Llanos | 50 | 36,800 | ..... |
| Caribbean | 24 | 17,400 | ..... |
| Pacific belt | 5 | 3,720 | ..... |
| Total | 100 | 73,028 | 21,000 |

Total area of Colombia: 1,162,240 sq. km. = 448,741 sq. miles.
Per cent of prospective oil land: 16.3.

**TABLE 2—COLOMBIAN OIL-LAND STATISTICS**

| | Area—Hectares (2.47 acres) | Area—Acres (approx.) |
|---|---|---|
| 1. National land solicited in concession under provisions of oil law and since 1931 | 2,581,918 | 6,350,000 |
| 2. Area contracted with the government of No. 1 | 1,217,141 | 3,000,000 |
| 3. Area of No. 2 subsequently surrendered | 343,456 | 845,000 |
| 4. Area of national land under contract | 873,685 | 2,160,000 |
| 5. Area of concessions under special contracts: | | |
| De Mares concession | 430,065 | 1,062,000 |
| Barco concession | 200,000 | 494,000 |
| 6. Approximate area of private oil land as of Nov. 15, 1941: | | |
| Owned in fee: | | |
| Magdalena Valley | 296,815 | 750,000 |
| Llanos region | 99,975 | 247,000 |
| Caribbean coastal region | 47,784 | 117,000 |
| Total | 444,574 | 1,094,000 |
| Leased: | | |
| Magdalena Valley | 361,744 | 890,000 |
| Llanos region | 175,420 | 433,000 |
| Caribbean coastal region | 359,226 | 889,000 |
| Total | 896,390 | 2,212,000 |
| 7. Total private oil land leased and owned in fee | 1,340,964 | 3,310,000 |
| 8. Total prospective oil land leased and owned in fee, No. 4 + No. 5 + No. 7 | 2,844,714 | 7,000,000 |
| 9. Estimated prospective oil land in Colombia | 18,975,000 | 46,700,000 |
| 10. Percentage of prospective oil land earmarked as of Nov. 15, 1941 | 15% | 15% |

follows: Mugrosa, 1; Colorado, 1; San Luis, 3. None of these wildcats proved a new field. In

**TABLE 3—CRUDE-OIL PRODUCTION IN COLOMBIA—COMPARISON 1940 AND 1941 PERIODS**

| | Oil production—De Mares 24.5° A.P.I. | Oil production—Barco 45° A.P.I. | Pipe-line deliveries—Andian | Pipe-line deliveries—S.A.G.O.C. |
|---|---|---|---|---|
| January-September, 1940 | 16,554,615 | 3,192,860 | 14,637,726 | 3,148,050 |
| January-September, 1941 | 15,086,844 | 2,893,995 | 13,274,850 | 2,863,574 |
| Difference | 1,467,771 | 298,865 | 1,352,875 | 284,476 |
| Percentage drop | —8.9% | —9.4% | —9.2% | —9.0% |

## Two Refineries Supply Demand Of Colombian Consumers

Two refineries are operating in Colombia and they have a combined capacity of 14,500 bbl. daily.

Tropical Oil Co.'s plant at Barranca Bermeja, adjacent to the La Cira and Infantas producing fields, has a capacity of 14,000 bbl. of crude daily. Most of the Tropical plant's production is consumed in Colombia by civilians and in company operations.

The other plant is owned by Colombian Petroleum Co. at Petroleo. The capacity of 500 bbl. of crude daily is sufficient to supply company operating requirements and to meet the civilian demand in the local area.

# Argentina Expands Refining Facilities

BUENOS AIRES, Argentina.—Two new refineries were commissioned this year in the Argentine Republic under the direction of Yacimientos Petroliferos Fiscales and a viscosity-breaking unit was placed in service at the La Plata refinery.

One of the new refineries is at Lujan de Cuyo in the Province of Mendoza and the other is in the city of Salta. Both of the new refineries are near substantial producing areas and they are designed and operated for the primary purpose of supplying demand in the surrounding territories.

The Lujan de Cuyo plant, which operates on Tupungato crude, consists of a combination installation for primary distillation, viscosity reduction and selective cracking of gas oil. Equipment is included for treatment of gasoline in the vapor phase, gasoline recovery and stabilization. The refinery has crude capacity of 3,150 bbl. daily. Crude is delivered to the plant by a pipe line from the Tupungato field to Anchoris at which point it is picked up by tank cars and moved the remainder of the distance by rail.

Production from the Lujan de Cuyo plant is broken down on an annual basis roughly as follows: Motor fuel, 598,500 bbl.; kerosene, 81,900 bbl.; diesel oil, 69,300 bbl., and fuel oil, 245,000 bbl.

The Salta refinery is about 4 miles from the capital of the province and has a daily crude-oil capacity of 1,890 bbl. The plant can produce 441,000 bbl. of gasoline annually, 18,900 bbl. of kerosene, 18,900 bbl. of gas oil and diesel fuel and 113,400 bbl. of fuel.

The viscosity-breaking unit in the La Plata refinery was placed in operation during the year and through use of this plant facility, Y.P.F. is lowering viscosity on approximately 5,000 bbl. of heavy fuel oil daily from 700 to 800 seconds, Saybolt Furol, at 122° F. to around 200 seconds. Fuel consumed in the Argentine Republic has a viscosity specification of 200 seconds, Saybolt Furol. The unit is used chiefly in reducing viscosity of fuel obtained from Comodoro Rivadavia field crude in the combination plant which is now the most extensive refinery operation in the country.

Despite the steady climb of production, Argentina still depends upon other countries for part of its petroleum requirements. Imports declined to 13,347,840 bbl. in 1940 and have been reduced again this year. Imports for 1941 probably will total between 10,000,000 and 12,000,000 bbl.

In 1940, the last year for which complete official data are available, Argentina exported 423,630 bbl. of petroleum products, consisting mostly of diesel and distillate fuel oils. Imports of 13,347,840 bbl. left a net balance of 12,924,210 bbl. as the deficiency of national production in that year.

Nearly 75 per cent of the petroleum imported by Argentina is fuel oil and more than 20 per cent consists of crude. Remainder of the petroleum imports are divided between gasoline, lubricating oils and greases.

### Refinery Runs Increasing

Crude runs to refineries in Argentina this year will total 26,500,000 to 27,000,000 bbl., according to calculations based on demand and the additions made to processing capacity since 1940 when runs to stills totaled 24,696,465 bbl. Argentina's production and crude-oil imports in 1940 totaled 24,455,680 bbl., indicating that about 240,000 bbl. of crude were withdrawn from storage during that year.

From crude runs totaling 24,696,465 bbl. in 1940, Argentine refineries produced 22,716,010 bbl. of products against consumption reported at 31,109,980 bbl. for the year. Production from Argentina refineries and the national consumption are shown in the following table:

(Data in barrels of 42 gal.)

| Products— | Refinery production | Argentine consumption |
|---|---|---|
| Motor fuel | 8,011,205 | 8,021,530 |
| Aviation gasoline | 75,870 | 79,280 |
| Kerosene, distillates | 1,598,270 | 1,519,280 |
| Turpentine | 34,535 | ..... |
| Gas oil | 877,305 | 710,780 |
| Diesel oil | 2,182,200 | 2,159,540 |
| Fuel oil | 9,107,520 | 18,163,675 |
| Asphalts | 385,610 | ..... |
| Lubricating oil | 443,495 | 455,895 |

If Argentine refineries process the indicated total of 27,000,000 bbl. this year it will be at the rate of 74,000 bbl. daily compared to a rated capacity of plants in the country aggregating more than 98,000 bbl. The lag of 25 per cent of actual runs behind rated capacity is about normal for all countries.

### Local Demands Served

Establishment of smaller units in sections of Argentina that are sparsely populated and, consequently, relatively small consuming areas appears to be the outgrowth of two significant trends. One is the spread of exploratory and exploitation operations to sections of the country further removed from the densely populated federal district around Buenos Aires.

The other is that of an indicated effort to reduce the cost of distribution. A few years ago, when Y.P.F. was assigned a specific portion of the federal-district consumption, it was considered likely that supplies to outlying parts of the country would suffer. Some of the higher costs of distributing products to remote areas requiring modest quantities of petroleum were offset by the more lucrative marketing operations in the federal district.

Location of refineries of sufficient producing capacity to meet requirements of western, northern and central sections of the country within those areas, particularly since crude-oil supplies have been located nearby, will eliminate parts of the previous long hauls from the eastern coastline terminals. This reduction in the cost of distribution may have a healthy reaction on consumption, if the savings are passed along to the users.

*Right: The tanker dock at Comodoro Rivadavia with terminal tankage on the shore and derricks on top of the hill in background*

*Below: View of the refining facilities at Y.P.F.'s most complete refinery at La Plata just south of Buenos Aires*

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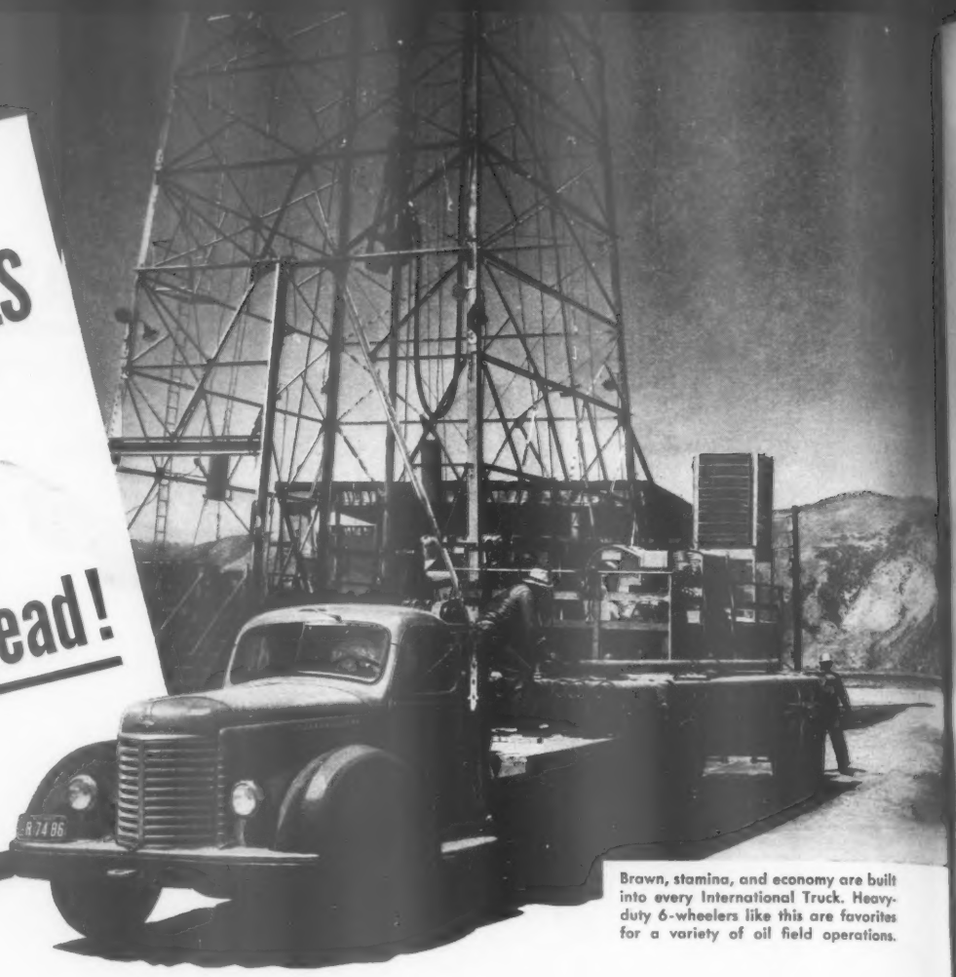

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MEN WHO DIRECT OPERATIONS OF YACIMIENTOS PETROLIFEROS FISCALES, ARGENTINE GOVERNMENT PETROLEUM AGENCY

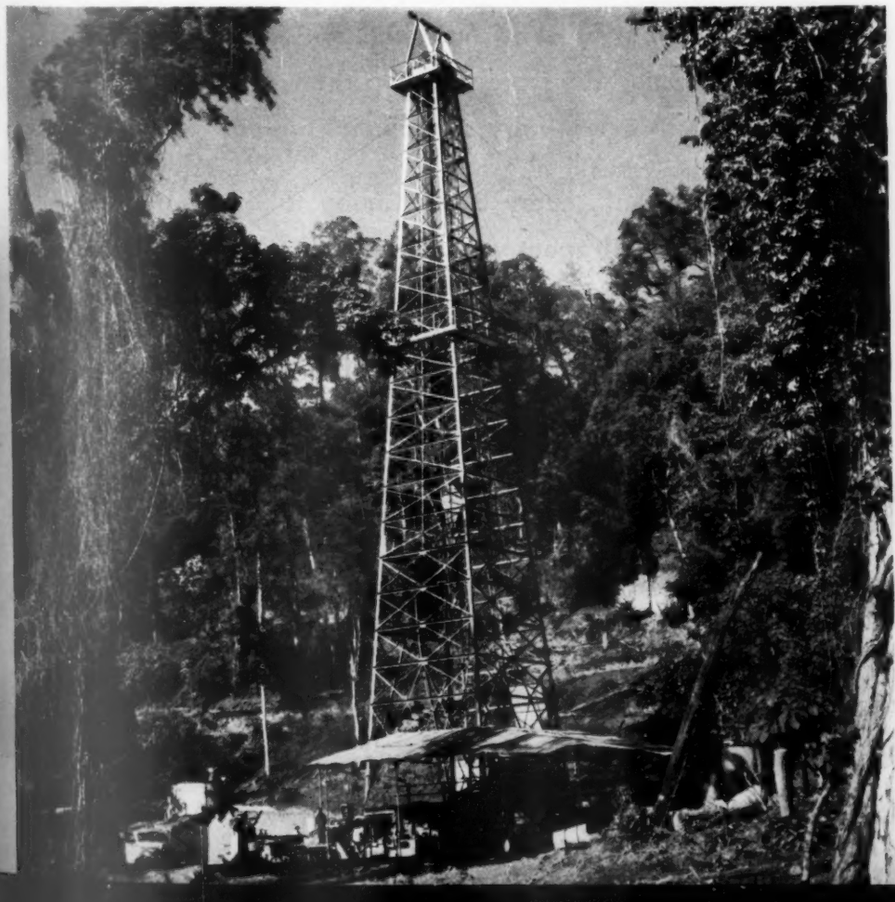
# Argentina's Crude Output Reaches 21,735,000 Bbl.

*SANTIAGO B. ZACCHEO*
*director*

*ALBERTO MENDEZ CASARIEGO*
*director*

BUENOS AIRES, Argentina.—Increase of about 5 per cent in the crude-oil production of Argentina, raising the country's output to a new high total of 21,735,000 bbl., is indicated this year on the basis of preliminary data. Nearly 80 per cent of the increased production, which is estimated at 1,093,075 bbl. for the year, has been contributed by fields in the Province of Mendoza in the western part of Argentina where several wells have shown outstanding productivity. Thirty-five per cent of the 1941 increase came from the Comodoro Rivadavia sector and about 4 per cent was contributed by fields in the Province of Salta. On the other side of the ledger, Plaza Huincul production decreased nearly 20 per cent this year.

Yacimientos Petroliferos Fiscales, the Argentine Government Oilfields, estimate its 1941 production at 13,815,000 bbl., a gain of 1,321,400 bbl. or 9 per cent while that of private companies will total about 7,919,100 bbl., a reduction of 2.8 per cent.



*Exploratory rig operating in the Rio Pescado district, Province of Salta, northern Argentina*

### Operating 29 Exploratory Rigs

A vigorous exploratory program was carried on throughout the year by Y.P.F. and at the beginning of 1942 the agency had 29 drilling rigs engaged in this work. Y.P.F. is operating 12 rigs in the Comodoro Rivadavia area, 5 in the Neuquen territory, 8 in the Province of Mendoza, and 4 in Salta.

The increase of more than 8 per cent in Y.P.F. production from the Comodoro Rivadavia district was owing chiefly to the new South Tordillo zone which entered the list of commercial fields during the early part of 1941. Y.P.F.'s well No. S.136, was the discovery of the South Tordillo field, and it was completed for initial yield of 755 bbl. of crude daily. Three additional wells, Nos. S.118, S.158, and S.163, have been completed in South Tordillo and they confirm indications that a field of considerable magnitude has been discovered at this point.

Efforts to develop deeper oil pays below those previously known in the El Tordillo area, which is north of the new field, were unsuccessful in a well drilled there during the year to a depth of 7,750 ft.

Y.P.F. drilled an exploratory well in the Bella Vista zone, about 8 miles northeast of the town of Comodoro Rivadavia, to 4,370 ft. but only slight showings of oil were logged. Y.P.F. wells, No. 0.3, 0.4, 0.5, 0.6, and 0.7, were drilled in the Golfo de

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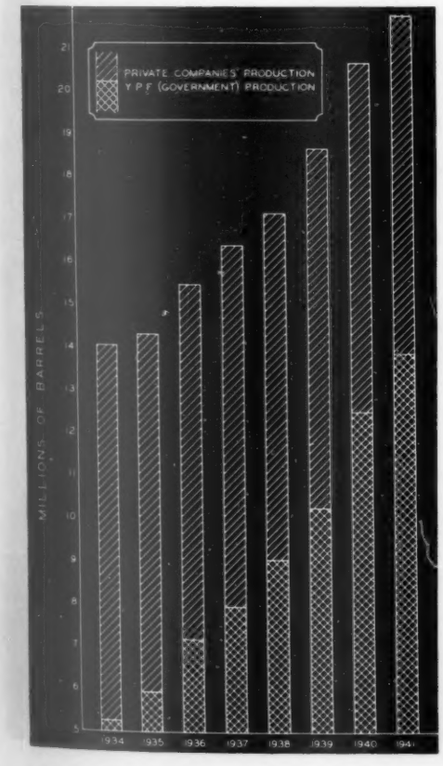
*Derricks standing over submerged locations in the Comodoro Rivadavia field, which produces a bulk of the country's oil*

San Jorge but all five were unsuccessful. Two of the wells, Nos. 0.3 and 0.4, were drilled in the Mangrullo district, about 30 miles south of the town of Comodoro Rivadavia, and the other three were in the Loberia district, 20 miles south of the same point. The two Mangrullo wells were abandoned after finding a basaltic formation and those in the Loberia area were halted when structural characteristics proved discouraging. At Colonia Las Heras, on Ballena hill, Y.P.F. drilled N.5 well to 6,138 ft. and found several deep gas pays. The well was 95 miles southwest of Comodoro Rivadavia.

A large gas well was developed in the Santa Cruz area by Cia. Ultramar S. A. The well, P.C. 1, was drilled in the Department of Lago Argentino at Piedra Clavada, and at 2,713 ft., the gas production was gaged at 12,350,500 cu. ft. daily. Flowing pressure at the well head was 600 lb. and closed-in pressure was 940 lb. per sq. in. Drilling continued to 4,756 ft. where it was completed without locating showings below the 2,700-ft. gas pay.




Exploratory drilling was prosecuted in several areas radiating from the Plaza Huincul field. In the Loma Negra section, 11 miles northwest of the center of the Plaza Huincul octagon, Y.P.F. hit showings of gas and oil in well N.L.1 that justified further exploration. During the last half of the year, Y.P.F. well N.L.3 hit oil showings in this district that indicate discovery of a field, although testing work is not yet conclusive.

## Results of Drilling

At Portezuelo, 20 miles west and southwest of Plaza Huincul, Y.P.F. N.J.1 indicated a new discovery at 2,755 ft. The company is now drilling well N.J.2, completion of which will afford a more definite appraisal of the value.

***Pie chart shows relationship of the current output from various oil-producing districts of Argentina. Columnar chart shows sharp rise of Y.P.F. production, yearly increases in national output and gradual contraction of recovery by private companies***

Other exploratory wells drilled by Y.P.F. in the territory of Neuquen and their results follow:

Well N.P.1, about 45 miles east of Plaza Huincul, drilled to 5,230 ft. where it was abandoned in the absence of showings.

Well N.S.2, about 40 miles east of Plaza Huincul and north of Senillosa station, showed an abundance of gas but failed to prove a connection for the pays in wells N.S.3 and N.S.4.

Well N.M.1, 33 miles northwest of Plaza Huincul, near the Paso de los Indios, was drilled to 9,125 ft. and abandoned as unproductive.

Well No. C.N.1, at Cerro Negro, about 46 miles west and northwest of Plaza Huincul, was unsuccessful in drilling to 5,790 ft.

***A drilling well in the inland portion of the Comodoro Rivadavia field***

## Salta and Jujuy Work

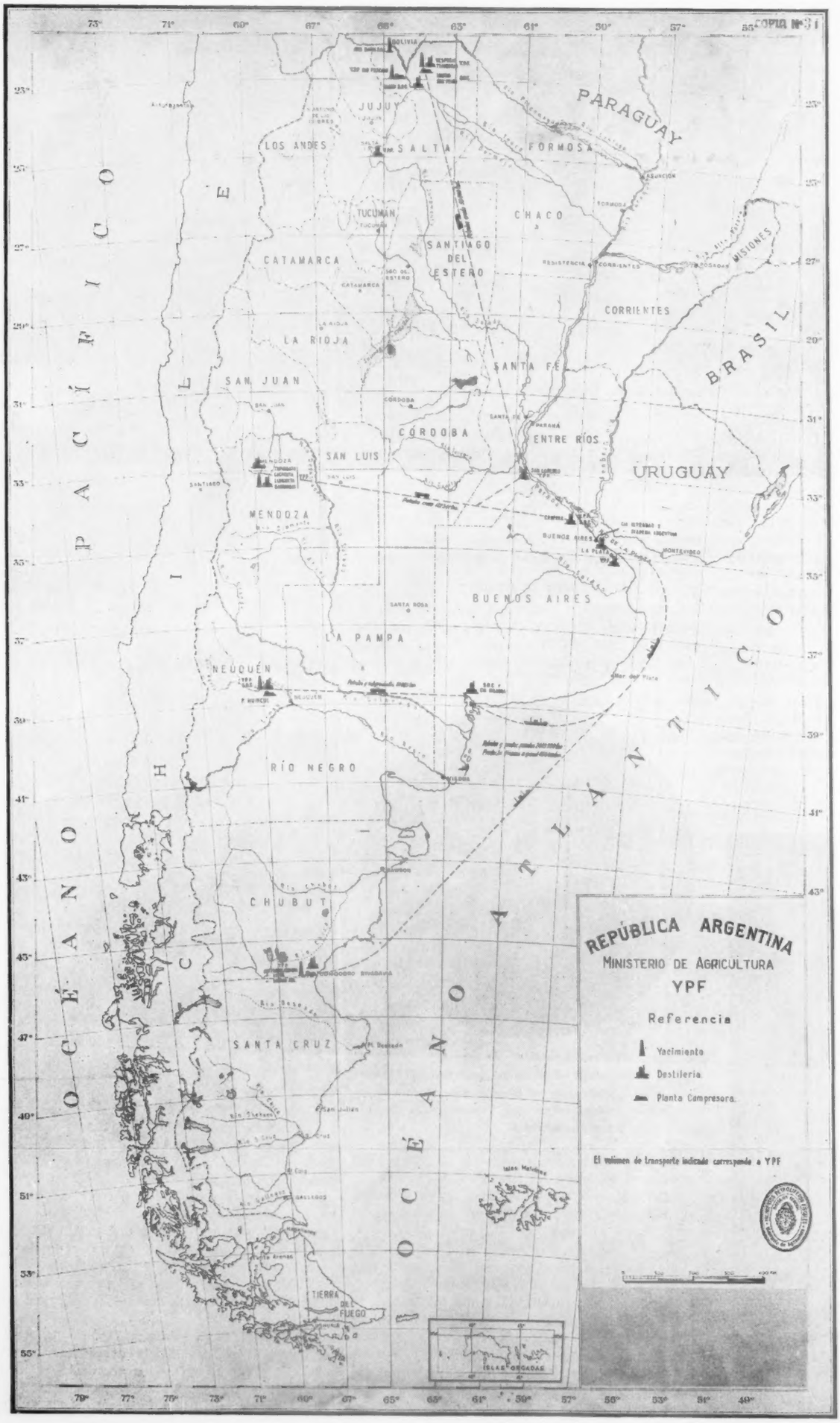
Y.P.F. completed T.85 in the Tranquitas field for substantial production but T.106, a more southern location, proved unproductive and was abandoned. North of Rio Pescado at Solasuti, well S.5 was abandoned at 3,778 ft. because of discouraging subsurface data.

South of Solasuti, Y.P.F. abandoned A.M.2 and is still drilling on A.M.3 which was progressing below 3,410 ft.

Several other tests were drilled in the Tranquitas and Rio Pescado areas for geological information.

In the Province of Jujuy, at Yuto on the western slope of the Santa Barbara anticline, Y.P.F. drilled J.B. 10 to 5,400 ft. where it was abandoned after finding only small showings of oil.

Cia. Ultramar drilled a failure to 4,435 ft. in




*Map of the Argentina oil fields, refineries, natural-gasoline plants and principal routes of oil traffic*

the Department of San Pedro, Jujuy Province.

### Mendoza Activity

Y.P.F. completed wells T.24, T.25, and T.28 as extension producers in the Tupungato field.

Northwest of the Tupungato field, well T.R.1 showed considerable oil but there was insufficient pressure to flow the production. Efforts are now under way to determine more conclusively the value of the possible discovery. A producer resulted in well B.1 at Barrancas which was drilled to the Lunlunta pay.

Five miles north of previous production in the Lunlunta field, Y.P.F. drilled wells L.4 and L.5 on the "north dome" and both were completed as good oil wells.

The deepest well in Argentina was drilled at Carrizal in the Province of Mendoza. When the year closed work on the well had been suspended at 9,480 ft. Technicians are still analyzing samples and attempting to evaluate several showings of oil logged in drilling to this record depth.

Three failures were drilled in the southern part of Mendoza Province, near Ranquil.

A gas well was completed north of Ranquil at Pampa Palauco and Y.P.F. is now drilling a second test in that vicinity.

### General Prospecting Program

The geological as well as the geophysical studies that Y.P.F. has undertaken tend to increase still further the knowledge acquired in previous years.

Geological research this year was carried out through the provinces of Salta, Jujuy, San Juan, San Luis, and Mendoza, as well as in the territories of Neuquen, Chubut, and Santa Cruz. Geophysical parties worked in the provinces of Santa Fe, Santiago del Estero, Mendoza, and Salta in addition to the territories of Chaco, Neuquen, Chubut, and Santa Cruz.

### Geological Studies

The geological work in the provinces and territories has been carried out by five or six commissions, consisting in the surveying of zones not previously studied and in detailing areas considered most fa-

*Pat. Pend.*

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## HUNT TOOL COMPANY

HOUSTON, TEXAS, U. S. A.

**ARGENTINA PRODUCTION**

**(Data in barrels for 8 months)**

| Region and company— | Jan.-Aug. 1940 | Jan.-Aug. 1941 | Difference Increase | Difference Decrease |
|---|---|---|---|---|
| Comodoro Rivadavia: | | | | |
| Y.P.F. | 5,554,135 | 5,996,055 | 441,920 | ..... |
| Astra | 584,655 | 618,490 | 33,835 | ..... |
| Diadema Argentina | 2,870,410 | 2,728,170 | ..... | 142,240 |
| Ferrocarrilera | 927,310 | 942,010 | 14,700 | ..... |
| Total, Comodoro Rivadavia | 9,936,510 | 10,284,725 | 348,215 | ..... |
| Plaza Huincul: | | | | |
| Y.P.F. | 475,285 | 366,280 | ..... | 109,000 |
| Standard of Argentina | 415,760 | 339,435 | ..... | 76,325 |
| Total, Plaza Huincul | 891,045 | 705,715 | ..... | 185,325 |
| Province of Salta: | | | | |
| Y.P.F. | 493,705 | 609,140 | 115,435 | ..... |
| Standard of Argentina | 694,900 | 616,025 | ..... | 78,875 |
| Total, Province of Salta | 1,188,605 | 1,225,165 | 36,560 | ..... |
| Province of Mendoza: | | | | |
| Y.P.F. | 1,414,745 | 2,156,040 | 741,295 | ..... |
| Total Argentina | 13,430,915 | 14,371,645 | 940,730 | ..... |

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vorable as mapped by these parties and previous surveys.

Preliminary exploratory work has been particularly extensive in the Province of Mendoza and the most important research work was done in the territories of Santa Cruz, Chubut, and Neuquen. Locations were staked for future drilling in nearly all of the areas subjected to intensive study.

### Production Justifies Mendoza Attention

The concentrated attention accorded the Province of Mendoza is justified on the basis of rising production from fields in that western portion of the country and from the character of wells developed. The accompanying table shows the trend of production by companies and districts during the first 8 months of this year in which the rise in Mendoza output has been the most significant change.

New oil reserves have been discovered during the year in the Plaza Huincul district but they are not yet under exploitation. There has been no new production of consequence developed in the older fields to compensate for the normal decline of older wells.

The moderate gain of production in the Province of Salta is owing to new development in the Rio Pescador area which started during the middle of 1940 and has been continued through the present.

Productive capacity of wells in the Tupungato zone of the Province of Mendoza is illustrated by Y.P.F. T.22, a flowing well which has produced 1,464,470 bbl. of oil in 22 months, an average of approximately 2,150 bbl. daily which marks it as the largest well in the country. Two other wells in the same section have impressive producing records. Well T.19 has produced 880,595 bbl. in 38 months and T.21 has produced 955,010 bbl.

Several wells have been placed on regular production schedules in the Lunlunta and Barrancas zones and they have contributed materially to the Mendoza output.

### First 8 Months' Production

Argentina's oil production for the first 8 months of 1941 is shown in the following table in comparison with the output for the same periods in the past 5 years.

| Year— | Production (bbl.) | Increase (bbl.) | Index (%) |
|---|---|---|---|
| 1937 | 10,792,890 | ..... | 100 |
| 1938 | 11,264,505 | 471,620 | 104 |
| 1939 | 12,143,645 | 879,140 | 113 |
| 1940 | 13,430,915 | 1,287,265 | 124 |
| 1941 | 14,371,655 | 940,740 | 133 |

Argentina produced a total of 20,641,925 bbl. of crude in 1940, an increase of 10.7 per cent which checks with the forecast published in the International Issue of The Oil and Gas Journal a year ago.

Details of 1940 production by fields and as between operations of Y.P.F. and private companies are shown in the table:

**PRODUCTION DURING 1940**

**(Figures in barrels)**

| District— | Y.P.F. | Private | Total |
|---|---|---|---|
| Comodoro Rivadavia | 8,483,195 | 6,516,895 | 15,000,090 |
| Plaza Huincul | 676,490 | 600,975 | 1,277,465 |
| Salta | 819,345 | 1,029,565 | 1,848,910 |
| Mendoza | 2,515,460 | ..... | 2,515,460 |
| Total | 12,494,490 | 8,147,435 | 20,641,925 |

The increase and decrease in production, for each zone, in 1940, compared with 1939, is shown in the following table:

| District— | Y.P.F. | Private | Total |
|---|---|---|---|
| Comodoro Rivadavia | *186,530 | *585 | *187,115 |
| Plaza Huincul | *34,755 | †58,404 | †23,650 |
| Salta | *327,865 | †192,220 | *135,645 |
| Mendoza | *1,706,550 | †6,495 | *1,070,055 |
| Total | *2,255,700 | †256,535 | *1,999,165 |

*Increase. †Decrease.

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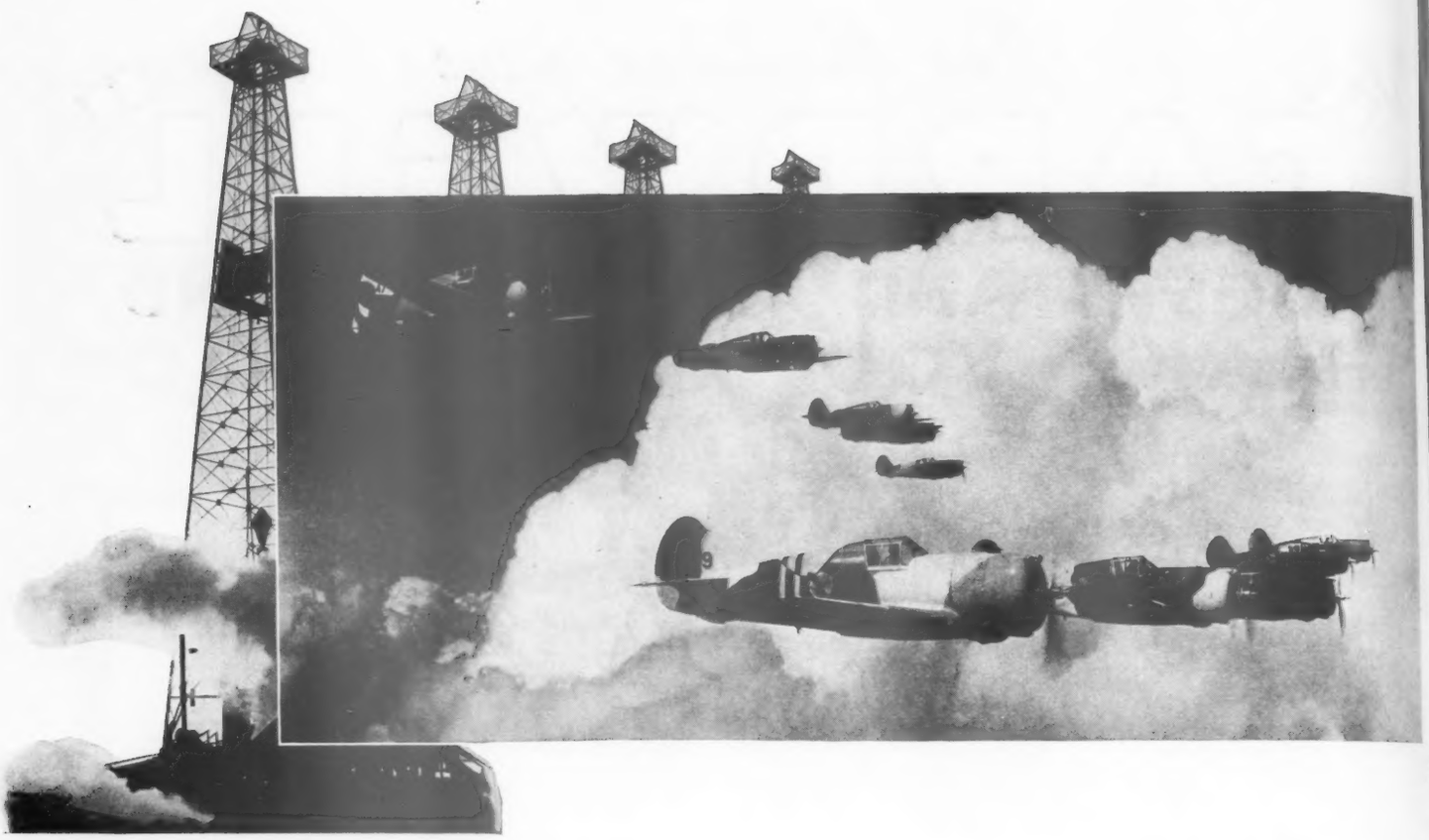

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# World Oil-Refineries Survey

**Data on refineries and fields in several of the countries which have been at war since the latter part of 1939 have been condensed in this report to show the number of plants and capacity and producing operations before the conflict started. There have been no confirmable reports this year on refineries and fields and their exact operating status in most of Europe, the Near and Far East.**

**Information in the detail of this report is new or revised on the basis of data that have become available since the last publication of a more extensive review in The Oil and Gas Journal, December 26, 1940.**

**It may be assumed, however, that most of the refineries in German occupied parts of Europe dependent on outside supplies of crude oil for operations are now inactive for the lack of raw material or because of damage suffered in prosecution of the war. This concept applies to Italy as well as France and others.**

### ARGENTINA

| Company and address— | Plant location | Superintendent | Crude capacity (bbl. dly.) | Type of refinery | Cracking equip.— Capacity (bbl. dly.) | Cracking equip.— Type | Operating status |
|---|---|---|---|---|---|---|---|
| Compania Ferrocarrilera de Petroleo, Peso Colon 185, Buenos Aires | Comodoro Rivadavia | C. Hargreaves | 8 000 | S-C | 2,000 | Cross | Op. |
| Cia. Nativa de Petroleos, Av. Roque Saenz Pena 567, Buenos Aires | Compana | W. J. Connelly | 16,000 | S-C-A-L | 8,800 | Link Tube & Tank | Op. |
| Cia. Nativa de Petroleos, Av. Roque Saenz Pena 567, Buenos Aires | Bahia Blanca | C. B. Lulkart | 2,000 | S-C | 1,500 | Cross | Op. |
| Diadema Argentina S.A. de Petroleo (Shell), Av. Roque Saenz Pena 788, Buenos Aires | Buenos Aires | J. Ph. van Goethem | 10,000 | S-C | 9,000 | Dubbs | Op. |
| Cia. El Condor, Levalle 27, Avellaneda | Avellaneda, Buenos Aires | M. Morales | 1,300 | S-L | None | None | Op. |
| Cia. "La Isaura," S.A., Av. Roque Saenz Pena 699, Buenos Aires | Bahia Blanca | W. Fergusson | 1,200 | S-C | 850 | Dubbs | Op. |
| Cia. Ultramar, S.A. Petroleo Argentina, Calle Chile 778, Buenos Aires | Buenos Aires | ..... | 5,900 | Comp. | 2,600 | deFlorez | Op. |
| Standard Oil Co., S.A., Argentina, Av. Roque Saenz Pena 567, Buenos Aires | Embarcacion | G. Gaensbauer | 1,000 | S | None | None | Op. |
| Standard Oil Co., S.A., Argentina, Av. Roque Saenz Pena 567, Buenos Aires | Plaza Huincul | ..... | 300 | S | None | None | Op. |
| Yacimiento Petroliferos Fiscales, R.S. Pena 777, Buenos Aires | La Plata | Dr. A. Zanetta | 31,450 | Comp. | 23,000 | Cross-Alco | Op. |
| Yacimiento Petroliferos Fiscales, R.S. Pena 777, Buenos Aires | San Lorenzo | Dr. J. Canessa | 9,500 | S-C | 7,550 | Gyro-Alco | Op. |
| Yacimiento Petroliferos Fiscales, R.S. Pena 777, Buenos Aires | Compana | Leslie J. Hudson | 3,600 | S-C | 1,000 | Cross | Op. |
| Yacimiento Petroliferos Fiscales, R.S. Pena 777, Buenos Aires | Godoy Cruz | Fermo Monti | 650 | S | None | None | Op. |
| Yacimiento Petroliferos Fiscales, R.S. Pena 777, Buenos Aires | Vespucio | Rafael Llabres | 500 | S | None | None | Op. |
| Yacimiento Petroliferos Fiscales, R.S. Pena 777, Buenos Aires | Plaza Huincul | Herminio Gioia | 1,575 | S | None | None | Op. |
| Others | | ..... | 925 | | | | |
| Total Argentina | | | 93,900 | | 56,390 | | |

### AUSTRALIA

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Commonwealth Oil Refineries, Ltd. (Anglo-Iranian), Scottish House, 90 William St., Melbourne | Laverton | G. F. McKillop | 3,500 | S | None | None | Op. |
| Shell Co. of Australia, Ltd., Bourke and William Sts., Melbourne | Clyde, N.S.W. | V. S. Smith | 2.750 | S-C | 1,000 | | Op. |
| Total Australia | | | 6,250 | | 1,000 | | |

### BAHREIN ISLAND

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Bahrein Petroleum Co., 135 East Forty-second St., New York | Bahrein I., Persian G. | ..... | 32,500 | S-C | 12,000 | Dubbs | Op. |

### BRAZIL

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Industrias Matarazzo de Energia S.A. "IME," Predio Conde Matarazzo, Sao Paulo | Sao Caetano | Dr. Oswald Fernandez Rinando | 2,500 | S | None | None | Op. |
| Ipiranga, S.A. Companhia Brasileira de Petroleas, Saco de Mangueira, sem numero, P.O. Box 56, Rio Grande | Rio Grande | Tomaz Pais Cunha | 1,800 | S | None | None | Op. |
| Standard Oil Co. of Brazil, Caixa do Correio 970, Rio de Janeiro | Sao Paulo | ..... | 2,160 | S | None | None | S.D. |
| Total Brazil | | | 6,460 | | | | |

### CANADA

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Detailed information on Canadian refineries appeared in the March 27, 1941, issue of The Oil and Gas Journal. | | | | | | | |
| Total of 54 refineries have capacity estimated at | | | 229,600 | ..... | 95,000 | | Op. |

### CANARY ISLANDS (Spain)

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Compania Espanola de Petroleos, S.A., Plaza de las Cortes 3, Madrid | Santa Cruz de Tenerriffe | J. Lliso | 5,000 | S-C | 4,100 | Dubbs | Op. |

### COLOMBIA

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Tropical Oil Co., Apt. 170, Via Cartagena, El Centro | Barranca Bermeja | W. E. Longworthy | 14,000 | S | None | None | Op. |
| Colombian Petroleum Co., 135 East Forty-second St., New York | Petrolea | ..... | 500 | S | None | None | Op |
| Total Colombia | | | 14,500 | | | | |

### CUBA

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Standard Oil Co. of Cuba, Apartado 1303, Havana | Belot | F. B. Preston | 4,200 | S-C-L-A | 2,100 | Tube & Tank | Op. |
| Cia. Cubana de Petroleo, S.A., Havana | Havana | ..... | 500 | S | | | Op. |
| Total Cuba | | | 4,700 | | 2,100 | | |

### ECUADOR

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Anglo-Equadorian Oilfields, Ltd., 146 Dashwood House, Old Broad St., E.C. 2, London, England | La Libertad | L. W. Berry | 2,200 | S | None | None | Op. |
| Ecuador Oilfields, Ltd., River Plate House, Finsbury Circus, E.C. 2, London, England; Apartado 865, Guayaquil, Ecuador | Cuativo | V. H. Perkoff | 650 | S | None | None | Op. |
| Total Ecuador | | | 2,850 | | | | |

### EGYPT

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Anglo-Egyptian Oilfields, Ltd., St. Helen's Court, Great St. Helen's E.C. 3, London, England | Suez | | 17,000 | S-C-A | 4,100 | Dubbs | Op. |
| Raffinerie de Petrole du Government, 18 Rue Found Ier Alexandria | Suez | A. H. Defrawi Eff. | 1,400 | S | None | None | Op. |
| Total Egypt | | | 18,400 | | 4,100 | | |

### GERMANY

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Bohemia-Moravia—Eleven refineries, total capacity | | ..... | 12.300 | .... | 1,100 | ..... | ... |
| Austria—Five refineries, total capacity | | ..... | 8,020 | .... | 750 | ..... | ... |
| France—Seventeen refineries, total capacity | | ..... | 156.650 | .... | 70.600 | ..... | ... |
| Belgium—Eight refineries, total capacity | | ..... | 10.975 | .... | 4.300 | ..... | ... |
| Old Reich—Thirty-one refineries, total capacity | | ..... | 48.450 | .... | 6,070 | ..... | ... |
| Poland—Nineteen refineries, total capacity | | ..... | 23.050 | .... | 2.300 | ..... | ... |
| Netherlands—One refinery, total capacity | | ..... | 18.000 | .... | 12,500 | ..... | ... |
| Hungary—Seven refineries, total capacity | | ..... | 11.670 | .... | .350 | ..... | ... |
| Yugoslavia—Three refineries, total capacity | | ..... | 4.800 | .... | .... | ..... | ... |
| Total Germany | | ..... | 293.915 | | 97.970 | | |

*(Continued on Page 110)*

# Ready for Immediate

**"OILWELL" No. 12** (12" x 12") VERTICAL STEAM ENGINES like this one on a deep well near Ventura, California, have ample power for heaviest loads. High operating speeds, made possible by accurately balanced vertical construction, result in high output. The hand-controlled variable steam cut-off assures fuel and feedwater economy.

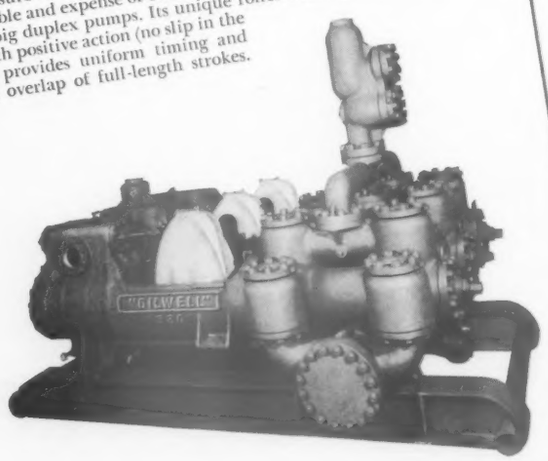
These efficient 12" x 12" Vertical Steam Engines are also available in the No. 12-D Model with an extended crankshaft equipped with a clutch and clutch sprocket for auxiliary service, in addition to the center sprocket for hoist drive.

"Oilwell" 12" x 12" Horizontal Twin-Cylinder Steam Engines are also available. These completely roller-bearing equipped, piston-valve engines have established excellent records for reliability and good all-around performance.

**"OILWELL" DUPLEX STEAM PUMPS** FOR BOILER-FEEDING and GENERAL SERVICE are built like big, high-pressure slush pumps. They are available in three sizes — 10" x 4½" x 10", 7" x 4½" x 10" and 6" x 4" x 6". Even the smallest size is equipped with balanced piston valves suitable for use with high-pressure superheated steam. The pumps illustrated are 10" x 4½" x 10" boilerfeed pumps.

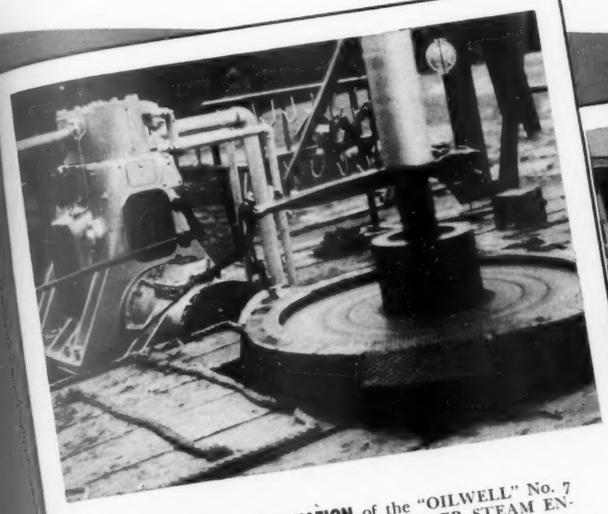
"Oilwell's" line of available duplex steam pumps also includes the 10" x 4" x 10" Cementing Pumps with 5000 lbs. per sq. in. working pressure fluid ends.

**THE NEW "OILWELL" No. 320** (18" x 7" x 20") TRIPLEX STEAM SLUSH PUMP is a revolutionary but thoroughly field-proved innovation for deep drilling. It provides all the volume and pressure needed for any service requirement, and eliminates the trouble and expense of either compound or parallel operation of two big duplex pumps. Its unique roller-bearing triplex valve gear with positive action (no slip in the valves) provides uniform timing and perfect overlap of full-length strokes.

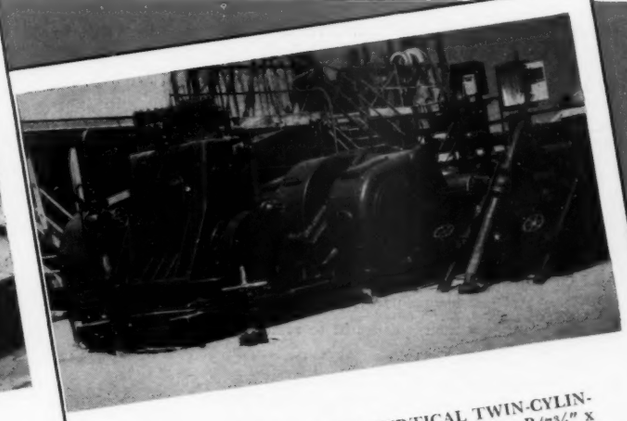



**"OILWELL" No. 20 AND "SUPER" DUPLEX** STEAM SLUSH PUMPS have repeatedly demonstrated their efficiency and dependability in deep drilling service. The addition of new heavy-duty parts—fully interchangeable with older designs—now makes these pumps better performers than ever. Improvements include a new grease-lubricated, roller-bearing valve gear and "HD" liner spacers of the roller-bearing type with external adjustment by a single screw. Pump shown is No. 20, size 16¼" x 7¾" x 20". Smaller sizes are also available.

# *Service* to keep 'em drilling



**A VERY POPULAR APPLICATION** of the "OILWELL" No. 7 (7¾" x 7") VERTICAL TWIN-CYLINDER STEAM ENGINE is the "Oilwell" Rotary Drilling Unit. The No. 7272 Two-Speed Unit illustrated is equipped with an "Oilwell" 27½-inch Oilbath Rotary, but rotaries of other sizes can be used. Like all other "Oilwell" Vertical Steam Engines the No. 7 is equipped with the steam-saving variable cut-off. It is widely used for driving power slush pumps, and is well suited for light or medium-duty hoisting.



**THIS "OILWELL" No. 9** (10" x 9") VERTICAL TWIN-CYLINDER STEAM ENGINE, driving an "Oilwell" No. 20-P (7¾" x 20") Power Slush Pump, has established records for economy, drilling speeds, and drilling depths in San Joaquin Valley, Cal. The No. 9 Engine develops ample power for largest power pumps, and saves 30 to 35% in fuel and feedwater consumption. It can be used also as part of a two-speed "Oilwell" Rotary Drilling Unit (equipped with an "Oilwell" 21-inch Super-Speed or 27½-inch Oilbath Rotary) or for hoisting service — individually for light or medium-duty rigs — in tandem (Double Engine Drive) for deepest drilling.

## *Efficient "OILWELL" Steam Drilling Equipment*

*WHEN* you need drilling equipment in a hurry, come to "Oilwell". These modern, efficient units are adaptable to a very wide range of drilling service. Because of their great reserve power they are the logical choice for the really heavy and high-speed work. But, regardless of the job to be done, "Oilwell" Steam Drilling Equipment is available to do it now and do it well.

Simplicity and sturdy construction are particularly timely advantages of "Oilwell" Steam Drilling Equipment. It is easy to handle, simple to adjust, and repair parts are always available.

# OIL WELL SUPPLY COMPANY

EXECUTIVE OFFICE—DALLAS, TEXAS
DIVISION OFFICES—OIL CITY, PA.
DALLAS, TEXAS LOS ANGELES, CALIF.

Branch Stores Serving All Oil Fields
United States Steel Corporation Subsidiary

EXPORT DIVISION OFFICE—
30 ROCKEFELLER PLAZA
NEW YORK CITY

## INDIA AND BURMA

| Company and address— | Plant location | Superintendent | Crude capacity (bbl. d/y.) | Type of refinery | Cracking equip.— Capacity (bbl. d/y.) | Cracking equip.— Type | Operating status |
|---|---|---|---|---|---|---|---|
| Assam Oil Co., Ltd., Britannic House, Finsbury Circus, E.C. 2, London, England | Digboi | | 6,000 | S-C | 2,100 | Dubbs | Op. |
| Attock Oil Co., Ltd., 6 Fenchurch Ave., E.C. 3, London, England | Rawalpindi | E. S. Millar | 4,000 | S-C | 2,500 | Dubbs | Op. |
| British Burmah Petroleum Co., Ltd., 5 and 6 Queen St. Place, E.C. 4, London, England | Rangoon | | 2,500 | S-C | 2,000 | Cross | Op. |
| Burmah Oil Co., Ltd., 175 West George Street, Glasgow, Scotland | Rangoon | | 20,000 | S-C | 3,000 | Dubbs | Op. |
| Indo-Burma Petroleum Co., Ltd., 622 Merchant St. (Box 1059), Rangoon | Seikgri | H. Roper | 3,500 | S-C | 1,000 | ..... | Op. |
| Indo-Burma Petroleum Co., Ltd., 622 Merchant St. (Box 1059), Rangoon | Kindat | H. Roper | 1,500 | S | None | None | Op. |
| United Refineries, Ltd. | Thilwa | | 500 | S | None | None | Op. |
| Total India (British India-Burma) | | | 38,000 | | 10,600 | | |

## IRAN

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Anglo-Iranian Oil Co., Ltd., Britannic House, Finsbury Circus, E.C. 2, London, England | Abadan | J. M. Pattinson | 280,000 | Comp. | 125,000 | Cross | Op. |
| Kermanshah Petroleum Co., Ltd., Britannic House, Finsbury Circus, E.C. 2, London, England | Kermanshah | | 3,000 | S | None | None | Op. |
| Anglo-Iranian Oil Co., Ltd., Britannic House, Finsbury Circus, E.C. 2, London, England | Bandar Shapur | | 50,000 | S-C | 30,000 | ..... | Op. |
| Total Iran | | | 333,000 | | 155,000 | | |

## IRAQ

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Iraq Petroleum Co., Ltd., City Gate House, Finsbury Circus, E.C. 2, London, England | Baba Gurgur | A. J. Pirks | 1,500 | S | None | None | Op. |
| Iraq Petroleum Co., Ltd., City Gate House, Finsbury Circus, E.C. 2, London, England | Kirkuk | | *100,000 | ..... | None | None | Op. |
| Khanaquin Oil Co., Ltd., Britannic House, Finsbury Circus, E.C. 2, London, England | Aldwan | J. Startup | 2,500 | S | None | None | Op. |
| Total Iraq (exclusive of stabilization plant) | | | 4,000 | | | | |

*This is a stabilization plant particularly designed to remove the $H_2S$.

## ITALY

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Italy—Ten refineries, total capacity | | | 57,300 | | 28,600 | | |

## JAPAN

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Aikoku Oil Co., Kawasaki, Kanagawa | Kawasaki | | 2,000 | S-C | 1,000 | ..... | Op. |
| Asahi Sekiyu Kabushiki Kaisha (Asahi Petroleum Co., Ltd.), No. 6 Itchome, Marunouchi, Kojimachi-Ku, Tokyo | Tokyo | Tsutomu Ito | 500 | S | None | None | Op. |
| Asahi Sekiyu Kabushiki Kaisha (Asahi Petroleum Co., Ltd.), No. 6 Itchome, Marunouchi, Kojimachi-Ku, Tokyo | Hikoshima, Yamaguchi | Makoto Nishinomiya | 500 | S | None | None | Op. |
| Hayama Oil Co., Marunouchi 2-chome 16, Tokyo | Kawasaki Kudamatsu | Sansuke Tamanoi | 3,000 | S-C | 1,000 | ..... | Op. |
| Imperial Japanese Navy | | | 3,000 | S-C | 1,500 | ..... | Op. |
| Chosen Sekiyu Kaisha, Genzan, Korea | Genzan | | 4,000 | Comp. | 1,250 | Cross | Op. |
| Mitsubishi Oil Co., Ltd., Yaesu Building, Marunouchi, Tokyo | Kawasaki | | 5,000 | | | | |
| Manchukuo-Japan Oil Co., Hsinking | Dairen, Manchukuo | | 3,000 | S-C | 850 | Dubbs | Op. |
| Nippon Oil Co., Ltd., Yuraku-Kan, Marunouchi, Tokyo | Amagasaki | C. T. Tsunoda | 4,000 | S-C | 4,000 | Cross | Op. |
| Nippon Oil Co., Ltd., Yuraku-Kan, Marunouchi, Tokyo | Kashiwazaki | Ryoichi Nishikawa | 3,000 | S-C | 1,500 | ..... | Op. |
| Nippon Oil Co., Ltd., Yuraku-Kan, Marunouchi, Tokyo | Niigata | Tadao Ohno | 2,800 | S | None | None | Op. |
| Nippon Oil Co., Ltd., Yuraku-Kan, Marunouchi, Tokyo | Akita | Seiji Magami | 4,000 | S-C | 1,000 | Cross | Op. |
| Nippon Oil Co., Ltd., Yuraku-Kan, Marunouchi, Tokyo | Tsurumi, Kanagawa | Yonetaro Oka | 6,000 | S | None | None | Op. |
| Nippon Oil Co., Ltd., Yuraku-Kan, Marunouchi, Tokyo | Kudamatsu, Yamaguchi | Kan Kimura<br>Dokichi Nakamori | 4,000 | Comp. | 1,000 | Dubbs | Op. |
| | | | 4,000 | Comp. | 1,000 | Cross | Op. |
| Nippon Oil Co., Ltd., Yuraku-Kan, Marunouchi, Tokyo | Karukawa, Hokkaido | | 300 | S | None | None | Op. |
| Nippon Oil Co., Ltd., Yuraku-Kan, Marunouchi, Tokyo | Byoritsu, Taiwan | Nobuteru Sato | 200 | S | None | None | Op. |
| Ogura Oil Co., Ltd., Kobunecho, Nihonbashi-ku, Tokyo | Tsurumi, Kanagawa | | 7,000 | S-C | 1,000 | Cross | Op. |
| Ogura Oil Co., Ltd., Kobunecho, Nihonbashi-ku, Tokyo | Tokyo, Oshima | Akira Daido | 3,500 | S-C | 2,000 | Jenkins-Cross | Op. |
| Maruzen Sekiyu Co. | Osaka | | 1,000 | Comp. | .... | ..... | Op. |
| Maruzen Sekiyu Co. | Niitsu, Niigata | | 120 | S-L | .... | ..... | Op. |
| Niitsu Sekiyu Co. (Marushin) | Nakadari | | 700 | Comp. | .... | ..... | Op. |
| Niitsu Sekiyu Co. (Marushin) | Niigata | | 500 | S-L | .... | ..... | Op. |
| Niitsu Sekiyu Co. (Marushin) | Akita | | 200 | S-L-A | .... | ..... | Op. |
| Toho-Sekiyu | Yokohama | | 500 | S-L-A | .... | ..... | Op. |
| Toho-Sekiyu | Osaka | | 700 | Comp. | .... | ..... | Op. |
| Toyo-Shoko | Yokohama | | 500 | S-L-A | .... | ..... | Op. |
| Nihon Seiro (shale) | Tokuyama | | 1,200 | Fuel & wax | .... | ..... | Op. |
| Other companies | | | 1,450 | ..... | .... | | |
| Total Japan | | | 67,670 | | 11,100 | | |

## REPUBLIC OF MEXICO

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Petroleos Mexicanos, Ave. Juarez 92-94, Mexico City | Ciudad Madero | S. Benavides | 57,000 | Comp. | 9,000 | Dubbs-Gyro | Op. |
| Petroleos Mexicanos, Ave. Juarez 92-94, Mexico City | Arbol Grande | J. Avina | 14,000 | S. | None | None | Op. |
| Petroleos Mexicanos, Ave. Juarez 92-94, Mexico City | Bella Vista | J. A. Roque | 4,000 | Comp. | 1,200 | Dubbs | Op. |
| Petroleos Mexicanos, Ave. Juarez 92-94, Mexico City | Mata Redonda | R. E. de la Fuente | 11,000 | Comp. | 7,500 | Kellogg | Op. |
| Petroleos Mexicanos, Ave. Juarez 92-94, Mexico City | Poza Rica | J. J. Merino | 7,500 | S.A. | None | None | Op. |
| Petroleos Mexicanos, Ave. Juarez 92-94, Mexico City | Minatitlan | C. Ziegler | 28,000 | Comp. | 2,000 | Dubbs* | Op. |
| Petroleos Mexicanos, Ave. Juarez 92-94, Mexico City | Mexico City | F. Aznar | 20,000 | S. | None | None | Op. |
| Total Mexico | | | 141,500 | | 19,700 | | |

Note: C. L. Corcuera is refineries manager for Petroleos Mexicanos. *Cracking plant shut down.

## NETHERLANDS EAST INDIES

### Borneo

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| De Bataafsche Petroleum Maatschappij (Shell), Carl van Bijlandtlaan 30, The Hague | Balikpapan | | 41,250 | Comp. | 7,400 | Dubbs | Op. |

### Java

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| N. V. de Bataafsche Petroleum Maatschappij (Shell), Carl van Bijlandtlaan 30, The Hague | Wonokromo | | 2,500 | S | None | None | Op. |
| N. V. de Bataafsche Petroleum Maatschappij (Shell), Carl van Bijlandtlaan 30, The Hague | Tjepoe | | 15,000 | S-C | 600 | Dubbs | Op. |
| Nederlandsche Koloniale Pet. Mij. (Standard-Vacuum), Gebouw Petrolea, P. O. Box 109, The Hague | Kapoen | | 500 | S | None | None | Op. |
| Total Java | | | 18,000 | | 600 | | |

### Sumatra

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| de Bataafsche Pet. Mij. (Shell), Carl van Bijlandtlaan 30, The Hague | Pangkalan Brandon | | 23,000 | S | None | None | Op. |
| de Bataafsche Pet. Mij. (Shell), Carl van Bijlandtlaan 30, The Hague | Pladjoe, Palembang | | 50,000 | S-C-L | 2,500 | Dubbs | Op. |
| Nederlandsche Koloniale Pet. Mij., Gebouw Petrolea, P. O. Box 109, The Hague | Palembang | H. M. Davidson | 45,000 | Comp. | 18,000 | Tube & Tank | Op. |
| Total Sumatra | | | 118,000 | | 20,500 | | |
| Total Netherlands East Indies | | | 177,250 | | 28,500 | | |

## NETHERLANDS WEST INDIES

### Aruba

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Arend Petroleum Maatschappij, Willemstad, Curacao | Bruif, Aruba | | 15,000 | S-C | 6,300 | Dubbs | Op. |
| Lago Oil & Transport Co., Ltd., Toronto, Ontario, Canada | Aruba, Curacao | L. G. Smith | 285,000 | S-C | 200,000 | Comb. visbr. | Op. |
| Total Aruba | | | 300,000 | | 206,300 | | |

### Curacao

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Curacaosche Petroleum Industrie Mij., Carl van Bijlandtlaan 30, The Hague | Emmastad | Dr. van N. Schonegevel | 185,000 | S-C | 114,000 | Dubbs-Cross | Op. |
| Total Netherland West Indies | | | 485,000 | | 320,300 | | |

# AN ANNOUNCEMENT

EUGENE McDERMOTT

Eugene McDermott, President of Geophysical Service Inc., announces the purchase of all the company's capital stock by himself and three associates, H. B. Peacock of Houston, Cecil H. Green of Dallas, and J. E. Jonsson of Dallas, all of whom have been actively identified with G.S.I. since its beginning in 1930.

Geophysical Service Inc., has been engaged in geophysical exploration work in the United States and countries all over the world for many years. 157 oil and gas fields are located upon structural anomalies indicated by G.S.I. surveys prior to drilling.

Management of the business will be continued under the leadership of Eugene McDermott as President, with H. B. Peacock and Cecil H. Green serving as Vice-Presidents. J. E. Jonsson is Secretary and Treasurer.

The company's home office and research laboratories will be maintained in Dallas, as well as the branch office in Houston, Texas.

H. B. PEACOCK

CECIL H. GREEN

*Call in*

**G.S.I.**

J. E. JONSSON

# GEOPHYSICAL SERVICE INC.

**EUGENE McDERMOTT, President**

SEISMOGRAPH SURVEYS

BRANCH OFFICE: HOUSTON, TEXAS

**DALLAS, TEXAS**

| Company and address— | Plant location | Superintendent | Max. crude capacity (bbl. dly.) | Type of refinery | Cracking equipment— Capacity (bbl. dly.) | Cracking equipment— Type | Operating status |
|---|---|---|---|---|---|---|---|
| **PALESTINE** | | | | | | | |
| Consolidated Refineries, Ltd., Britannic House, Finsbury Circus, E.C. 2, London, England | Haifa | L. W. Chuter | 40,000 | S-C | 20,000 | Kellogg | Op. |
| **PERU** | | | | | | | |
| Establecimiento Industrial de Zorritos, Apartado 130, Calle Constitucion 25, Callao | Zorritos | ..... | 1,000 | S | None | None | Op. |
| International Petroleum Co., Ltd., 56 Church St., Toronto, Sarnia, Ontario, Canada | Talara | R. H. Ebbets | 20,000 | S-C | 6,800 | Tube & Tank | Op. |
| Compania de Petroleo Ganso Azul, Ltda. | Aguas Calientes | ..... | 1,000 | S | None | None | Op. |
| Total Peru | | | 22,000 | | 6,800 | | |
| **PORTUGAL** | | | | | | | |
| Soc. Concessionaire pour le Refinacao de Petrole en Portugal, 57 rua do Alecrim, Lisbon | Lisbon (Cado Ruivo) | ..... | 5,000 | S-C-L | 1,500 | ..... | Op. |
| **RUMANIA** | | | | | | | |
| Astra Romana S.A. (Shell), No. 32 Boulevard Regele Carol 1, Bucarest | Ploesti-Sud | E. Pfister | 43,000 | Comp. | 13,000 | Dubbs | Op. |
| Colombia Societie Franco-Rumanine de Petrol, 10 rue Romana, Bucarest | Ploesti-Sud | P. Bouvier | 10,000 | S-C | 5,000 | Dubbs | Op. |
| Concordia Societie Anonyme Rumaine pour l'Industrie due Petrole, Strada Matei Millo, No. 15, Bucarest | Ploesti-Nord | M. G. Baliff | 29,000 | S-S | 4,200 | None | Op. |
| Creditul Miniere S.A. Rumaine pour le Developpement, de l'Industrie Miniere, Boulevard Bratianu 16, Bucarest | Brazi-Prahova | T. Dodrescu | 11,000 | Comp. | 3,500 | Dubbs | Op. |
| Creditul Miniere S.A. Rumaine pour le Developpement, de l'Industrie Miniere, Boulevard Bratianu 16, Bucarest | Doicesti | ..... | 1,750 | S | None | None | Op. |
| Dacia Romano Petroleum Synd., Ltd., 83 Cannon St., E.C. 2, London, England; Cantacuzino 33, Bucarest | Ploesti-Nord | C. M. Leitch | 5,000 | S | None | None | Op. |
| Neo Petrole (Fratia) | Ploesti-Sud | ..... | 3,000 | S | None | None | S.D. |
| I. Grigorescue S.A., Str. Poetul Alexandrescu No. 30, Targoviste | Targoviste | M. Istrati | 1,500 | S | None | None | Op. |
| Noris | Ploesti-Sud | ..... | 1,200 | S | None | None | S.D. |
| "Petrol Block" Societe Anonima Romana, Strada Nicolae Golescu No. 7, Bucarest | Ploesti | M. Silberstein | 8,500 | S-C | 4,000 | Dubbs | Op. |
| "Petrol Block" Societe Anonima Romana, Strada Nicolae Golescu No. 7, Bucarest | Bucarest | Dr. Stevermann-Dr. Lobel | 1,100 | S | None | None | S.D. |
| | Plopeni-Prahova | ..... | 1,000 | S | None | None | Op. |
| Petrol Latina, S.A. Romana, Strada Benito Mussolini 53, Bucarest | Ploesti | ..... | 3,000 | S | None | None | S.D. |
| "Petrolmina" Societate, Romana de Mine si Petrol, Strada Gogu C. Cantacuzino 33, Bucarest | Brasov | ..... | 750 | L-W-A | None | None | Op. |
| "Photogen" Rafineria de Petrol, S.A. (Socony-Vacuum), Str. Juli Maniu 104-108, Brasov | Ploesti-Nord | M. Sain | 3,500 | S | None | None | S.D. |
| "Redeventza" S.A. Pentru Exploatarea si Comertul Produselor Suposolului, Rue Georges Clemenceau No. 2, Bucarest | Teleajen | D. I. Maxwell | 20,000 | Comp. | 8,000 | Tube & Tank | Op. |
| Romano-Americana S.A. (Standard of New Jersey), 126 Calea Victoriei, Bucarest | Ramnicul-Sarat | ..... | 1,000 | S | None | None | S.D. |
| "Romano-Belgiana Depetrol" S.A., Strada Biserica Amzei No. 28, Bucarest | Ploesti | ..... | 5,000 | S | None | None | Op. |
| Spies Petroleum Co., Ltd., 17 Waterloo Place, S.W. 1, London, England | Campina | ..... | 31,000 | Comp. | 6,300 | Dubbs | Op. |
| Steaua Romana S.A. pour l'Industriedu Petrole, Boulevard Carol No. 17, Bucarest | Moinesti | ..... | 2,000 | S | None | None | Op. |
| Steaua Romana, Boulevard Carol No. 17, Bucarest | Bucarest | ..... | 1,000 | S | None | None | Op. |
| Rafinaria de Petrol Titan, S.A.R., Boulevard Carol No. 30, Bucarest | | | | | | | |
| "Unirea" Societate Anonima Romanada Petrole (Phoenix Oil & Transport Co., Ltd.), Strada Gen. Berthelot No. 90, Bucarest | Ploesti (2 plants) | M. Wilson | 23,000 | Comp. | 3,500 | ..... | (*) |
| Miscellaneous (25 small refineries) | ..... | ..... | 5,000 | .... | .... | | |
| Total Rumania | | | 211,300 | | 47,500 | | |
| *Reported destroyed by explosion and fire. | | | | | | | |
| **SARAWAK** | | | | | | | |
| **British East Indies** | | | | | | | |
| Sarawak Oilfields, Ltd. (Shell), Miri, Sarawak, Miri | Lutong | ..... | 20,000 | S-L | None | None | Op. |
| **SWEDEN** | | | | | | | |
| A. Johnson & Co., Stockholm | Nynashamn | ..... | 3,500 | S-C | 2,700 | Dubbs | Op. |
| **TRINIDAD** | | | | | | | |
| Trinidad Central Oilfields, Ltd., 16 Cameron St., E.C. 4, London, England | Claxton Bay, Tabaquite | F. Middleton | 500 | S | None | None | Op. |
| Trinidad Lake Asphalt Operating Co., Ltd. (subsidiary of General Asphalt Co.), Barber, N. J.; Philadelphia, Pa. | Brighton | ..... | 1,000 | A | None | None | Op. |
| Trinidad Leaseholds, Ltd., 1 London Wall Buildings, E.C. 2, London, England | Point-a-Pierre | F. L. Melvill | 35,000 | Comp. | 18,350 | Dubbs | Op. |
| United British Oilfields of Trinidad, Ltd., St. Helen's Court, Great St. Helen's E.C. 2, London, England | Point Fortin | ..... | 40,000 | S-C | 10,000 | ..... | Op. |
| Trinidad Oil Fields Operating Co., Ltd., Port of Spain | La Brea | R. F. Caldwell | 1,300 | .... | None | None | Op. |
| Goldan & Co., Ltd., Mon Repos, San Fernando | ..... | ..... | 500 | S | None | None | S.D. |
| Kern Trinidad Oilfields, Ltd., 36-38 Kingsway, W.C. 2, London, England | San Fernando | A. J. Ruthven-Murray | 1,000 | S | None | None | Op. |
| Total Trinidad | | | 79,300 | | 28,350 | | |
| **UNITED KINGDOM** | | | | | | | |
| Great Britain—Thirteen refineries, total capacity | | | 68,250 | | 11,000 | | |
| Scotland—Four refineries, total capacity | | | 23,200 | | 6,000 | | |
| Wales—One refinery, total capacity | | | 22,000 | | 3,500 | | |
| Total United Kingdom | | | 133,450 | | 20,500 | | |
| **UNITED STATES** | | | | | | | |
| Total United States, 550 refineries, total capacity | | | 4,826,715 | | 2,276,760 | | |
| **URUGUAY** | | | | | | | |
| Administracion Nacionale de Combustibles Alcohol y Portland, 25 de Mayo 409 (P. O. Box 869), Montevideo | Montevideo | Ernesto S. Pelufo | 6,300 | Comp. | 2,000 | Dubbs | Op. |
| **U.S.S.R.** | | | | | | | |
| U.S.S.R.—Number of refineries unreported; approximate capacity | | | 705,000 | | 192,900 | | |
| **VENEZUELA** | | | | | | | |
| Caribbean Petroleum Co. (Shell), Apartado 19, Maracaibo | San Lorenzo | W. F. C. Mackie | 40,000 | S | None | None | Op. |
| Colon Development Co., Ltd. (Shell), Apartado 19, Maracaibo | Casigua | Siro Bravo | 700 | S | None | None | Op. |
| Colon Development Co., Ltd. (Shell), Apartado 19, Maracaibo | La Rivera | Julio Bermudez | 200 | S | None | None | Op. |
| Colon Development Co., Ltd. (Shell), Apartado 19, Maracaibo | El Calvario | Ezequiel Leon | 200 | S | None | None | Op. |
| Compania de Petroleo Lago, Apartado 849-869, Caracas | La Salina | L. R. Kirsheman | 36,500 | S-A | None | None | Op. |
| Standard Oil Co. of Venezuela, Apartado 889, Caracas | Caripito | D. E. Johnson | 31,000 | S-C | 31,000 | Vis-bkr. | Op. |
| Mene Grande Oil Co., Apartado 234, Maracaibo | Cabimas | S. H. Oter | 1,800 | S | None | None | Op. |
| Mene Grande Oil Co., Caracas | Oficina | D. H. Caddel | 830 | S | None | None | Op. |
| Tocuyo Oilfields of Venezuela, Ltd., Caracas | El Mene de Acosta | ..... | 250 | S | None | None | S.D. |
| British Controlled Oilfields, Ltd., Caracas | El Mene de Mauroa | A. S. Cameron | 250 | S | None | None | Op. |
| Total Venezuela | | | 111,730 | | 31,000 | | |

(Continued on Page 117)

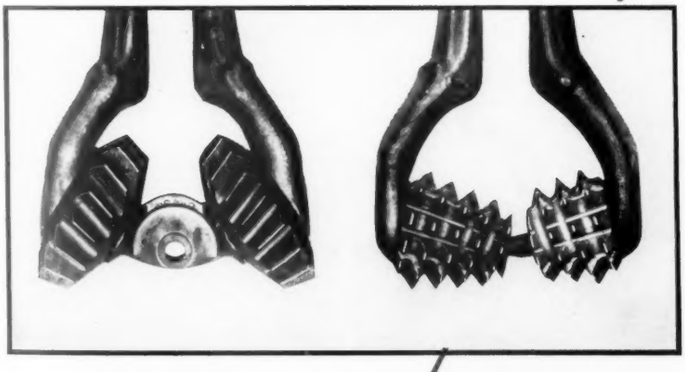
# "INCREASED SERVICE" STARS *that have built* REED LEADERSHIP...

## REED ROCK BITS

### ARE *Unitized* FOR GREATER SAFETY *and* GREATER STRENGTH

**The independently supported cutters of Reed Rock Bits provide greatly increased bearing support and more accurate balance, giving added assurance of free cutter action and longer life. The bridge is a brace and a tie, preventing loss of gauge and promoting greater safety through unitization of the individual cutter units.**

**Reed Rock Bits are furnished in many designs which are classified in seven series, each design manufactured to efficiently drill specific formations.**



ADDED STRENGTH
Bridge prevents "spreading apart" or "crowding in" of side cutters

ADDED SUPPORT
Cross cutter journals are "trussed together" for added strength

The Reed Interchangeable Mud Nozzle Assembly is another improvement in rock bit design pioneered by Reed.

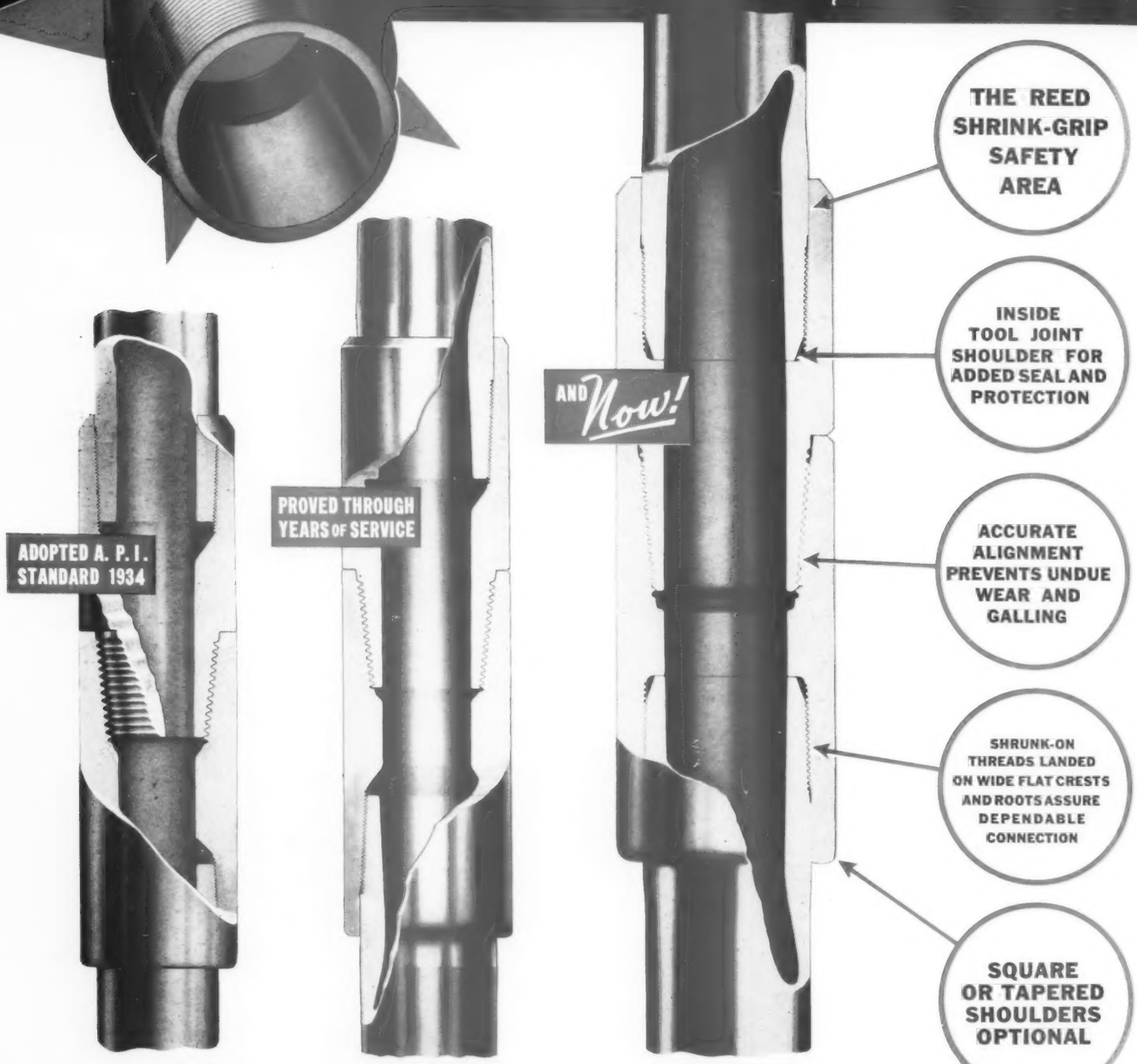
Various sizes of jets may be had to accommodate any mud pump capacity or circulation requirements, allowing correct selection at the rig.

Available for 5⅞" through 13" range

**THERE'S A REED ROCK BIT ESPECIALLY DESIGNED FOR SPECIFIC FORMATIONS**

# The REED...

## SUPER SHRINK GRIP TOOL JOINTS


ADOPTED A. P. I. STANDARD 1934
PROVED THROUGH YEARS OF SERVICE
AND Now!
THE REED SHRINK-GRIP SAFETY AREA
INSIDE TOOL JOINT SHOULDER FOR ADDED SEAL AND PROTECTION
ACCURATE ALIGNMENT PREVENTS UNDUE WEAR AND GALLING
SHRUNK-ON THREADS LANDED ON WIDE FLAT CRESTS AND ROOTS ASSURE DEPENDABLE CONNECTION
SQUARE OR TAPERED SHOULDERS OPTIONAL

*The* REED
Full Hole Tool Joint
1934

*The* REED
Shrink-Grip Tool Joint
1936

*The* REED
*SUPER*
Shrink-Grip Tool Joint
1941

# REED'S...

## *Complete* CORING SERVICE

## *with the improved* REED *Kor-King* CORE DRILL

**The Reed Kor-King is simple in construction with non-rotating or floating type inner-barrel, operating against oil proof, slush lubricated rubber bearings; an exclusive Reed Kor-King feature. The toggle type core catchers are non-rotating and of unified construction. Hard and soft formation cutter heads are interchangeable and are designed for fast cutting and long life.**

**THE REED STREAMLINED *KOR-KING***
**FOR SMALL HOLE DRILLING**
***and for***
**GEOPHYSICAL EXPLORATION**

**The Reed Streamlined *Kor-King* is fully streamlined, can be pulled through a stuffing box and practically eliminates the hazards of sticking in the small bore wells.**

## *and the improved* REED 'BR' *Wire Line* CORE DRILL

**The Reed "BR" Wire Line Core Drill is especially adapted for coring and drilling soft, medium hard and hard formations, and results through years of usage in fields throughout the world have established it as the leading wire line core drill, for either continuous or intermittent coring. Compactness, simplicity of construction and light weight make possible usage on remote locations.**

## REED CORE DRILLS ASSURE MAXIMUM RECOVERY

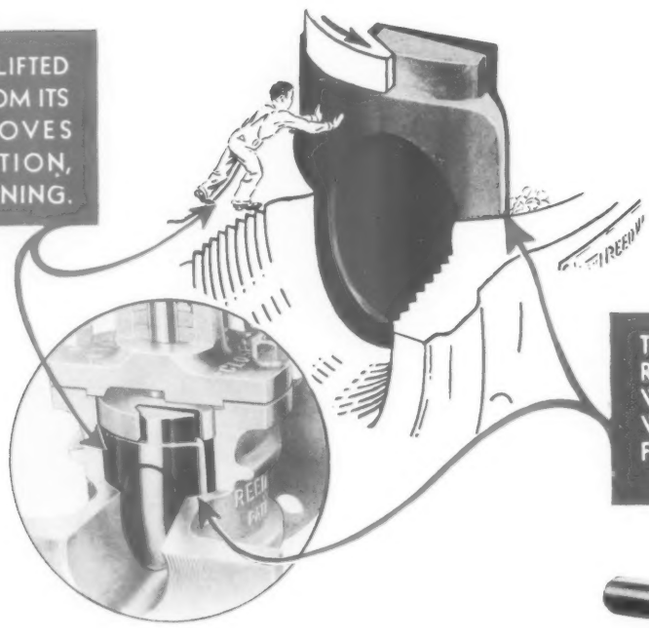
# REED VALVES...

*for*

EASE OF OPERATION *and*
LOW MAINTENANCE COSTS

## *through these exclusive* REED VALVE FEATURES

THE SEATING DISC IS LIFTED DIRECTLY AWAY FROM ITS SEAT BEFORE IT MOVES TO THE OPEN POSITION, ASSURING EASY OPENING.

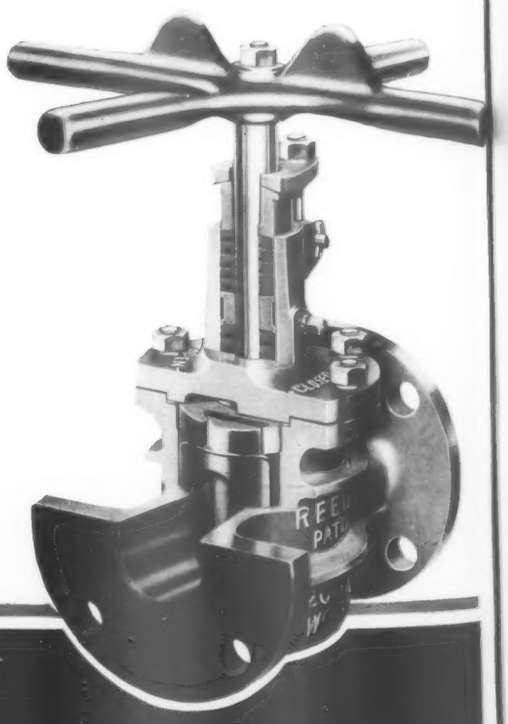


★ Discs lifting directly away from their seats before valve starts to open.

★ Discs cleaning their seats as valve opens or closes.

THIS EDGE OF THE DISC REMAINS IN CONTACT WITH THE INNER BODY WALL, WIPING THE SURFACE WHEN THE VALVE IS BEING OPENED.

**The Reed Valve design is basically that of the double disc gate valve, but is a marked improvement over that type of valve. Exclusive features embodied in the design assure clean seats—positive closure and easy, trouble-free operation. A slight movement of the valve stem toward the open position lifts the seating disc directly away from its seat, partially equalizing the pressure on both sides of the downstream disc and reducing friction to a minimum. The valve is then moved to the open position with exceptional ease. The cleaning action of the disc on the inner body wall, together with the through-conduit in the disc holder, combine to make erosion of Reed Valve Seats a negligible factor, and assures an easy operating, tight seating valve at all times.**



### EUROPEAN MISCELLANEOUS

| Country and number of refineries— | Location of refineries— | Crude capacity | Cracking capacity |
|---|---|---|---|
| Denmark—Three refineries | Copenhagen and Kalundborg | 620 | None |
| Eire—One refinery | Haulbowline | 600 | None |
| Estonia—Four shale-oil plants | ..... | 1,000 | None |
| Latvia—One refinery | Muehlgraben (Rita) | 200 | None |
| Norway—One refinery | Vallo | 1,200 | None |
| Spain—One refinery | Barcelona | 1,500 | None |
| Total | | 5,120 | |

### MISCELLANEOUS AFRICA

| | | | |
|---|---|---|---|
| Belgian Congo—One refinery | Leopoldville | 250 | 150 |
| Libya—One refinery | Tripoli | 2,000 | None |
| Union of South Africa—One refinery | Ermelo, Transvaal | 1,000 | None |
| Total | | 3,250 | 150 |

### MISCELLANEOUS SOUTH AMERICA

| | | | |
|---|---|---|---|
| Bolivia—Two refineries | Sanandita and Camira | 725 | None |
| Chile—Three refineries | Inquique, Del Mar, Talcahuano | 535 | None |
| Total | | 1,260 | |

# Survey of World Oil Fields

### ARGENTINA

| Name of field and location— | Producing wells | Daily av. prod. (bbl.) | Wells drilling | Producing depths | Gravity A.P.I. | Base of crude | Outlet | Age of field (years) |
|---|---|---|---|---|---|---|---|---|
| Comodoro Rivadavia (Chubut): | | | | | | | | |
| Zone A, (Costa) | 1,791 | 42,150 | 7 | 2,200-2,500 | 22.3 | A.-P. | Tankers | 34 |
| Zone B, (Escalante) | 651 | | 10 | 3,675-3,775 | 31 | A.-P. | Tankers | 17 |
| Zone C | 410 | | 2 | 1,970-2,150 | 19.8 | A.-P. | Tankers | 25 |
| Zone D (Colonia Sarmiento) | .... | ..... | ... | 2,295-2,625 | 23 | A.-P. | Tankers | 8 |
| Plaza Huincul (Neuquen): | | | | | | | | |
| Zone No. 1 | 40 | 2,892 | ... | 1,875-1,990 | 32 | P. | Tank cars | 23 |
| Zone No. 2 | 134 | | 1 | 2,365-2,510 | 31.7 | P. | Tank cars | 15 |
| Zone No. 3 | 83 | | ... | 2,400-2,590 | 33.5 | P. | Tank cars | 17 |
| Zone No. 4 | .... | ..... | ... | 3,360-3,365 | 38.5 | P. | Tank cars | 7 |
| Province of Salta: | | | | | | | | |
| Zone Tartagal | 112 | 5,021 | 3 | 1,470-1,770 | 43.4 | P. | Tank cars | 15 |
| Zone San Pedro | 25 | | ... | 2,900-2,975 | 45.5 | P. | Tank cars | 13 |
| Zone Agua Blanca | 5 | | ... | 4,590-4,920 | 23 | A. | Tank cars | 15 |
| Zone Rio Pescado | 14 | | 2 | 4,100-4,389 | 23 | A. | Tank cars | 2 |
| Province of Mendoza: | | | | | | | | |
| Zone Cacheuta | 28 | 8,837 | 1 | 2,000-2,050 | 30.7 | A.-P. | Tank cars | 10 |
| Zone Tupungato | 17 | | 7 | 5,810-6,000 | 30.2 | P. | Tank cars | 8 |
| Zone Lunlunta | 5 | | 2 | 7,055-7,098 | 29.6 | P. | Tank cars | 2 |
| Zone El Sosneado | .... | ..... | ... | 545-555 | 13 | A. | Tank cars | 16 |
| Total | 3,315 | 58,900 | 35* | | | | | |

*Exclusive of extensive exploratory drilling.

### COLOMBIA

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Infantas, Santander | 298 | 9,760 | 0 | 2,000 | 25.4 | Mixed | Local & Export | 23 |
| La Cira, Santander | 512 | 49,210 | 0 | 3,500 | 25.4 | Mixed | Local & Export | 15 |
| Petrolea, N. Santander | 90 | 10,760 | 1 | 475-1,600 | 43 | Mixed | P.L. to Covenas | 8 |
| Rio de Oro, N. Santander | ... | ..... | 0 | 2,400 | 30 | Mixed | None | 4 |
| Carbonera, N. Santander | ... | ..... | 1 | 1,900 | 19 | Mixed | Local | 3 |
| Total Colombia | 900 | 69,730 | 2* | | | | | |

*Exclusive of extensive exploratory drilling.

### ECUADOR

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| El Tambo | 6 | 10 | 0 | 1,200 | 34 | N. | Refinery | 10 |
| Concepcion | 10 | 30 | 1 | ..... | 38 | M. | ..... | 11 |
| Cautivo | 30 | 30 | 0 | 500-1,200 | 35 | M. | Refinery | 21 |
| Ancon | 485 | 5,500 | 3 | 1,200-3,800 | 36-41 | P.M. | ..... | 21 |
| Carolina and Santa Paula | 15 | 100 | 1 | 30-600 | 18-28 | M. | ..... | 9-23 |
| Santa Rita—Achall and San Raimundo | 34 | 175 | 2 | 500-1,200 | 28 | A. | Refinery | 6-9 |
| Tigro | 7 | 1,200 | 1 | 4,000 | 39 | P. | Local | 5 |
| Total Ecuador | 587 | 7,045 | 8 | | | | | |

### EGYPT

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Hurghada | 73 | 2,100 | ... | 1,595-1,720 | 36 | M. | Refinery | 28 |
| Ras Gharib | 47 | 17,500 | ... | 3,500 | 38 | M. | Tankers | 4 |
| Total Egypt | 120 | 19.600 | ... | | | | | |

### GERMANY

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Slovakia-Moravia | 20 | 400 | ... | 425-790 | 19-20 | M. | Local | 21-27 |
| France—Pechelbronn | 750 | 1,400 | ... | 820-3,050 | 29-30 | P. | Local | 205 |
| Morocco | 80 | 90 | ... | 270-3,115 | 12-15 | .. | Local | 4 |
| Algeria | 12 | 8 | ... | | | .. | Local | 29 |
| Old Reich—All fields | ... | 12,500 | ... | 1,000-3,600 | 18-35 | Var. | Local | 21-81 |
| Austria—Zistersdorf | ... | 2,200 | ... | 3,400-3,600 | 20-25 | P.M. | Local | 8 |
| Poland | 3,800 | 10,000 | ... | 200-5,700 | 27-47 | Var. | P.L. | 6-83 |
| Total Germany | .... | 26.598 | ... | | | | | |

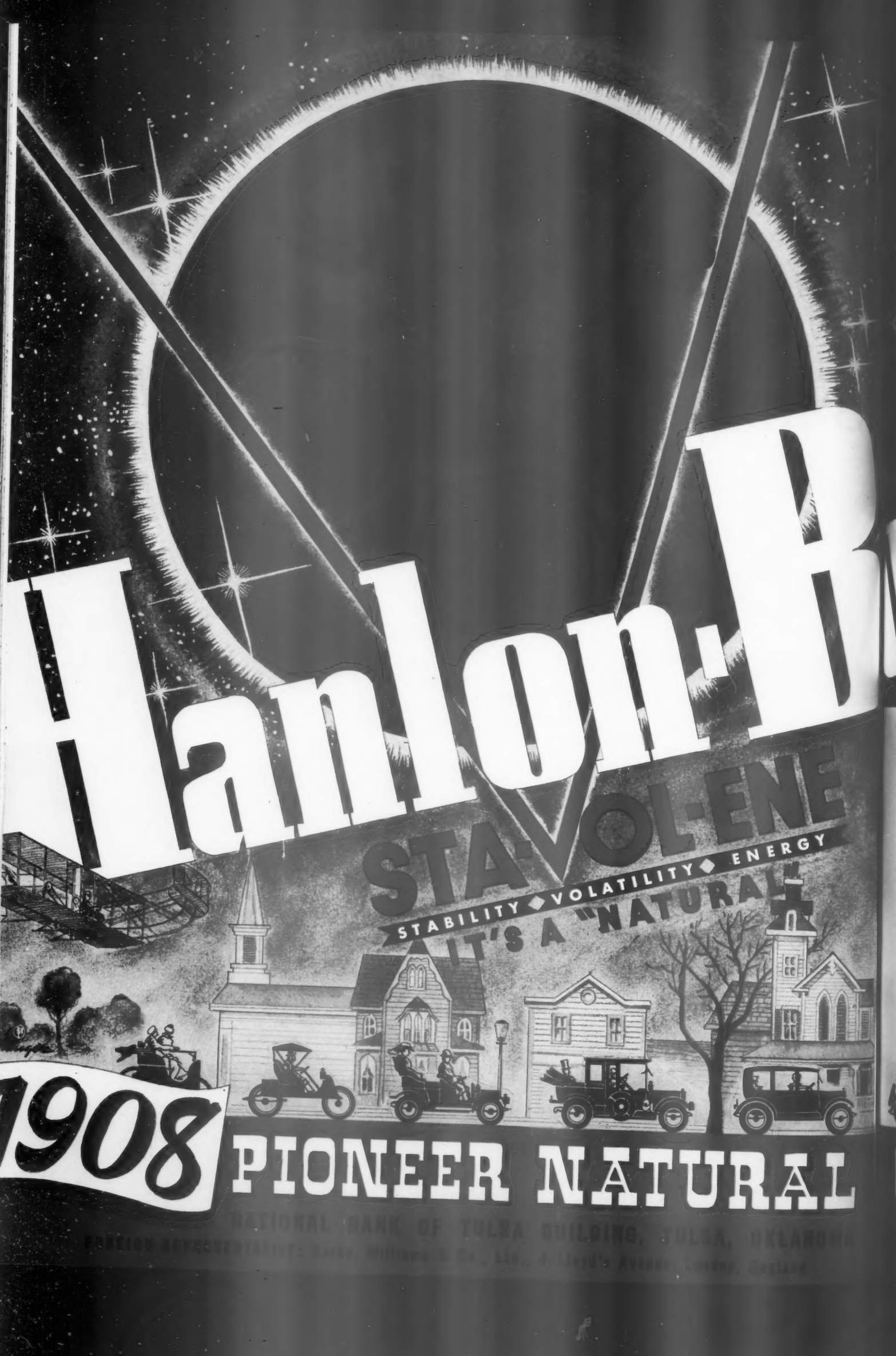
### HUNGARY

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Bukkszek | 21 | 50 | ... | 335-340 | 34 | P. | P.L.-T.C. | 5 |
| Budafapuszta—Lovaszi-ujfalr | 60 | 10,420 | 5 | 3,675-4,100 | 40 | P. | P.L.-T.C. | 5 |
| Total Hungary | 81 | 10,470 | 5 | | | | | |

### INDIA-BURMA

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| India: | | | | | | | | |
| Digbol, Assam | 190 | 3,500 | 2 | 500-5,600 | 30-40 | P. | P.L.-Ref. | 53 |
| Attock Punjab: | | | | | | | | |
| Khaur | 145 | 100 | 3 | 100-6,000 | 35-42 | P. | P.L.-Ref. | .. |
| Dhulian | 20 | 2,000 | 2 | 3,800-7,800 | 40-45 | P. | P.L.-Ref. | 4 |
| Burma: | | | | | | | | |
| Indaw, Minbu | 75 | 200 | ... | | 36-42 | M. | P.L.-Ref. | .. |
| Singu | 570 | 9,000 | 3 | 1,800-5,000 | 45 | M. | P.L.-Ref. | .. |
| Thayetmyo | ... | 150 | ... | 600-2,500 | 45 | M. | P.L.-Ref. | .. |
| Upper Chindivin | ... | 175 | ... | ..... | ..... | M. | P.L.-Ref. | .. |
| Yenangyat-Lanywa | 335 | 1,850 | 2 | 400-4,200 | 32-60 | M. | P.L.-Ref. | .. |
| Yenangyanung | 2,875 | 9,400 | 4 | 300-6,000 | 45 | M. | P.L.-Ref. | .. |
| Total India-Burma | 4,210 | 20,575 | 16 | | | | | |

*(Continued on Page 120)*


Hanlon-B
STA-VOL-ENE
STABILITY ◆ VOLATILITY ◆ ENERGY
IT'S A "NATURAL"
1908
PIONEER NATURAL

# Buchanan, Inc

THIRTY-FOUR years ago Ed Hanlon built his first natural gasoline plant near Sistersville, West Virginia. Since that day the automobile has changed the world's transportation and Natural Gasoline has contributed much toward its growth. Today over 6,000,000 men and women in the United States are earning their living in the Petroleum and Automobile Industry. From the "six iron barrels" that was the total daily capacity of that first Hanlon plant, Hanlon-Buchanan now supplies domestic, coastwise and foreign markets daily with thousands of barrels of uniform Stabilized Natural Gasoline — STA-VOL-ENE the "Natural" known throughout the World.

# 1942



# L GASOLINE MANUFACTURER

TERMINALS: GOODHOPE, Louisiana DAYTON, Texas TEXAS CITY, Texas
HOUSTON, Texas CORPUS CHRISTI, Texas GALENA PARK, Texas

## IRAN

| | Producing wells | Daily av. prod. (bbl.) | Wells drilling | Producing depths | Gravity A.P.I. | Base of crude | Outlet | Age of field (years) |
|---|---|---|---|---|---|---|---|---|
| Masjid-Sulaiman | * 31 | 35,000 | ... | 2,500-3,500 | 37.6 | Paraffin | P.L.-Ref. | 30 |
| Haft Kel | † 27 | 90,000 | ... | 4,500-5,000 | 37.6 | Paraffin | P.L.-Ref. | 12 |
| White Oil Springs | 3 | shut in | ... | ..... | ... | Paraffin | ..... | 7 |
| Gach Saran | 9 | 4,500 | ... | 4,500-6,000 | ... | Paraffin | P.L.-Ref. | 5 |
| Naft-i-Shah | 10 | 1,500 | ... | ..... | ... | Paraffin | Ref. | 14 |
| Total Iran | 75 | 131,000 | ... | | | | | |

*Excludes about 40 input and observation wells.
†Excludes about 15 input and observation wells.

## IRAQ

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Kirkuk | 42 | 20,000 | ... | 2,100-2,200 | 36 | M. | P.L. | 13 |
| Qaiyarah-Najmah: | | | | | | | | |
| Jawan-Qasab— | | | | | | | | |
| Lower Fars zone | 3 | | | 650 | 18.2 | M. | ..... | 5 |
| Limestone zone | 42 | 100 | ... | 690 | 15.8 | | ..... | 13 |
| Pilsner zone | 8 | | | 1,500 | 17.0 | M. | ..... | 6 |
| Naft Khaneh | 7 | 400 | ... | | | | | |
| Total Iraq | 102 | 20,500 | | | | | | |

## NETHERLANDS EAST INDIES

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| British Borneo: | | | | | | | | |
| Sarawak and Brunei | 460 | 17,500 | ... | 130-5,790 | 32 | M. | Refinery | 32 |
| East Borneo: | | | | | | | | |
| Balikpapan and Tarakan | 890 | 32,000 | ... | 210-3,280 | 18 | A. | Refinery | 46 |
| Ceram | 50 | 1,500 | ... | 240-1,020 | ... | M. | Refinery | 45 |
| Java | 335 | 17,000 | ... | 130-3,000 | ... | M. | Refinery | 54 |
| South Sumatra: | | | | | | | | |
| Palembang-Djambi | 1,375 | 91,000 | ... | 130-2,950 | 37.8 | P. | Refinery | 45 |
| North Sumatra | 175 | 20,000 | ... | ..... | ... | M. | Refinery | 56 |
| Total East Indies | 3,285 | 179,000 | ... | | | | | |

## PERU

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| La Brea-Parinas, Piura | 2,003 | 30,680 | 9 | 1,000-3,500 | 38 | M. | Local & Export | 52 |
| Lobitos and Restin, Piura | 815 | 8,150 | 7 | 150-6,500 | 36 | M. | Local & Export | 38 |
| Zorritos, Tumbes | 54 | 160 | 2 | 600-3,000 | | M. | Local & Export | 53 |
| Pachitea | 2 | Shut in | ... | 1,050-1,150 | 46.4 | P | None | 3 |
| Pirin, Dept. of Puno | 4 | 100 | 1 | 800 | 35 | M. | Local | 23 |
| Total Peru | 2,876 | 39,090 | 19 | | | | | |

## REPUBLIC OF MEXICO

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| San Luis Potosi: | | | | | | | | |
| El Limon | 24 | 333 | ... | 1,855-2,750 | 11.6 | A. | Pipe line | 19 |
| Ebano-Chapacao | 102 | 5,957 | 6 | 1,465-2,725 | 11.6 | A. | P.L.-Barges | 37 |
| Tamaulipas: | | | | | | | | |
| Altamira | 17 | 388 | ... | 1,420-2,610 | 15.7 | A. | B. | 15 |
| Veracruz: | | | | | | | | |
| Alazan | 2 | 255 | ... | 2,000-2,320 | 22.1 | A.-P. | P.L. | 29 |
| Alamo-San Isidro | 23 | 694 | ... | 2,095-2,295 | 24.0 | A.-P. | P.L. | 28 |
| Cerro Viejo | 3 | 295 | ... | 1,890-2,295 | 22.8 | A.-P. | P.L. | 20 |
| Cacalilao | 112 | 5,009 | ... | 1,250-2,575 | 12.3-12.7 | A.-P. | P.L.-B. | 19 |
| Corcovado | 43 | 1,086 | ... | 1,975-2,750 | 11.7 | A. | P.L. | 17 |
| Cuichapa | 5 | 8 | ... | 2,084-2,355 | 25.0-26.0 | P. | P.L. | 2 |
| El Burro | 34 | 2,196 | ... | 2,445-4,455 | 27.3 | P. | P.L. | 16 |
| El Plan | 43 | 10,113 | 8 | 1,790-5,745 | 22.5 | P. | P.L. | 10 |
| Filisola | 49 | 991 | ... | 2,775-3,555 | 21.5 | P. | Barges | 18 |
| Juan Felipe-Moralillo | 6 | 640 | ... | 3,450-3,850 | 20.9 | A.P. | P.L. | 8 |
| Panuco | 118 | 2,598 | ... | 1,312-2,955 | 11.7-14.5 | A. | P.L.-B. | 28 |
| Potrero-Horcones | 9 | 351 | ... | 1,815-1,940 | 21.8 | A.-P. | P.L. | 31 |
| Poza Rica | 32 | 76,531 | 7 | 6,715-8,500 | 28.0-34.0 | A.-P. | P.L. | 11 |
| San Diego-Chiconcillo | 6 | 139 | ... | 2,140-2,600 | 20.4-21.4 | A.-P. | P.L. | 18 |
| Sur Chinampa-Norte Amatlan | 23 | 1,238 | ... | 1,540-2,290 | 20.4-21.4 | A.-P. | P.L. | 32 |
| Sur Amatlan | 33 | 2,715 | ... | 1,810-2,455 | 20.4-21.4 | A.-P. | P.L. | 28 |
| Salinas-El Barco-Caracol | 17 | 425 | ... | 2,000-3,150 | 12.5 | A.-P. | P.L.-T.C. | 22 |
| San Sebastian | 1 | 32 | ... | 2,600-3,210 | 13.1 | A. | B. | 12 |
| Tanhuijo | 2 | 1 | ... | 450-3,220 | 22.0 | A.-P. | B. | 30 |
| Tepetate-Norte Chinampa | 10 | 941 | ... | 1,980-2,400 | 20.7-21.1 | A.-P. | P.L. | 26 |
| Toteco-Cerro Azul | 41 | 4,407 | ... | 1,680-2,885 | 19.9-20.9 | A.-P. | P.L. | 32 |
| Tierra Blanca-Chapopote Nunez | 10 | 445 | ... | 1,970-2,310 | 20.9 | A.-P. | P.L. | 20 |
| Tierra Amarilla | 8 | 54 | ... | 2,435-2,480 | 22.7 | A.-P. | P.L. | 30 |
| Topila | 47 | 858 | ... | 595-3,365 | 11.5-19.0 | A. | P.L.-B.-T.C. | 20 |
| Teapa Nuevo* | ..... | ..... | ... | 325-1,814 | ... | ..... | ..... | ... |
| Tonala | 80 | 2,927 | ... | 1,860-3,280 | 28.7 | P. | P.L. | 13 |
| Zacamixtle | 6 | 39 | ... | 2,190-2,520 | 20.5-21.2 | A.-P. | P.L. | 21 |
| Total Mexico | 906 | 121,666 | 21 | | | | | |

*Notes: Teapa Nuevo shut in. Data courtesy Petroleos Mexicanos.

## RUMANIA*

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Moreni, Prahova District | 290 | 12,000 | ... | 1,000-5,000 | 33 | M. | P.L. | 38 |
| Piscuri, Prahova | 125 | 7,000 | ... | 1,200-4,000 | 33 | M. | P.L. | 14 |
| Margineni, Prahova | 18 | 3,000 | ... | 6,100-7,500 | 39 | P. | P.L. | 6 |
| Aricesti, Prahova | 8 | 400 | ... | 5,000-7,400 | 35 | P | P.L. | 20 |
| Tintea, Prahova | 110 | 25,500 | ... | 600-8,800 | 39 | M. | P.L. | 80 |
| Baicoi, Prahova | 44 | 1,800 | ... | 600-8,800 | 39 | M. | P.L. | 80 |
| Lilesti, Prahova | 12 | 1,400 | ... | 600-8,800 | 39 | M. | P.L. | 80 |
| Boldesti, Prahova | 100 | 13,000 | ... | 6,900-7,900 | 37 | P. | P.L. | 19 |
| Ceptura, Prahova | 138 | 12,000 | ... | 2,400-4,100 | 34 | P. | P.L. | 28 |
| Runcu Bustenari, Prahova | 155 | 1,500 | ... | 100-2,500 | 42 | P. | P.L. | 97 |
| Chiciura-Bustenari-Bordeni, Prahova | 450 | 2,100 | ... | 100-2,500 | 42 | P. | P.L. | 97 |
| Campina | 60 | 450 | ... | 700-1,200 | 41 | P. | P.L. | 57 |
| Gura Draganesei-Pitigaia | 3 | 30 | ... | 1,100-4,200 | 38 | P. | P.L. | 61 |
| Copaceni | 5 | 50 | ... | 700-2,200 | 41 | P. | P.L. | 37 |
| Scaiosi | 4 | 10 | ... | 1,450-1,800 | 40 | P. | P.L. | 12 |
| Total Prahova | 1,522 | 80,240 | ... | | | | | |
| Gura-Ocnitei, Dambovita | 340 | 22,000 | ... | 5,400-5,900 | 33 | P. | P.L. | 12 |
| Rasvad, Dambovita | 35 | 4,100 | ... | 600-1,400 | 38 | P. | P.L. | 85 |
| Bucsani, Dambovita | 88 | 5,000 | ... | 6,500-7,300 | 38 | P. | P.L. | 8 |
| Ochiuri, Dambovita | 95 | 5,000 | ... | 1,300-4,000 | 33 | M. | P.L. | 28 |
| Teis-Aninoasa, Dambovita | 10 | 750 | ... | 500-1,000 | 37 | P. | P.L. | ... |
| Viforata, Dambovita | 10 | 300 | ... | 600-1,900 | 38 | P. | P.L. | ... |
| Glodeni, Dambovita | 5 | 5 | ... | 1,000-2,000 | 39 | P. | P.L. | 44 |
| Total Dambovita | 581 | 37,155 | ... | | | | | |
| Arbanasi, Buzau | 80 | 700 | ... | 200-1,000 | 38 | P. | P.L. | 72 |
| Solont, Stanesti, Zemes, Tasiau, Moinesti, Lucacesti, Comanesti, Grozesti, Tetcani, Casin Bacau District | 175 | 800 | ... | 200-2,200 | 43 | P | P.L. | 69 |
| Total Bacau District | 255 | 1,500 | ... | | | | | |
| Total Rumania | 2,358 | 118,895 | ... | | | | | |

*Estimated and conjectural.

## SAUDI ARABIA

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Dammam | 16 | 7,000 | 1—‡6 | 4,500 | 35.5 | A. | (†) | 3 |
| Dammam | 3 | 160 | ... | 2,100 | 50 | A. | (†) | 5 |
| Dammam | 1 | (gas) | ... | 2,100 | 35.5 | .. | ..... | 1 |
| Abu Hadriya | 1 | (shut in) | ‡1 | 10,220 | ... | .. | ..... | ... |
| Ma'agala | .... | ..... | ‡1 | ..... | ... | .. | ..... | ... |
| Abqaiq | .... | ..... | 1—‡1 | 6,180 | ... | .. | ..... | ... |
| Total Saudi Arabia* | 21 | 7,160 | 2 | | | | | |

*Produced and marketed by California Arabian Standard Oil Co. (Standard of California and Texas Co.). †Pipe line to Ras Tanura and Al Khobar, Saudi Arabia, sea terminals. ‡Suspended.

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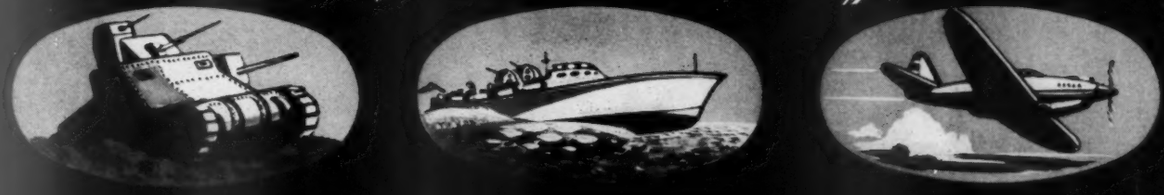

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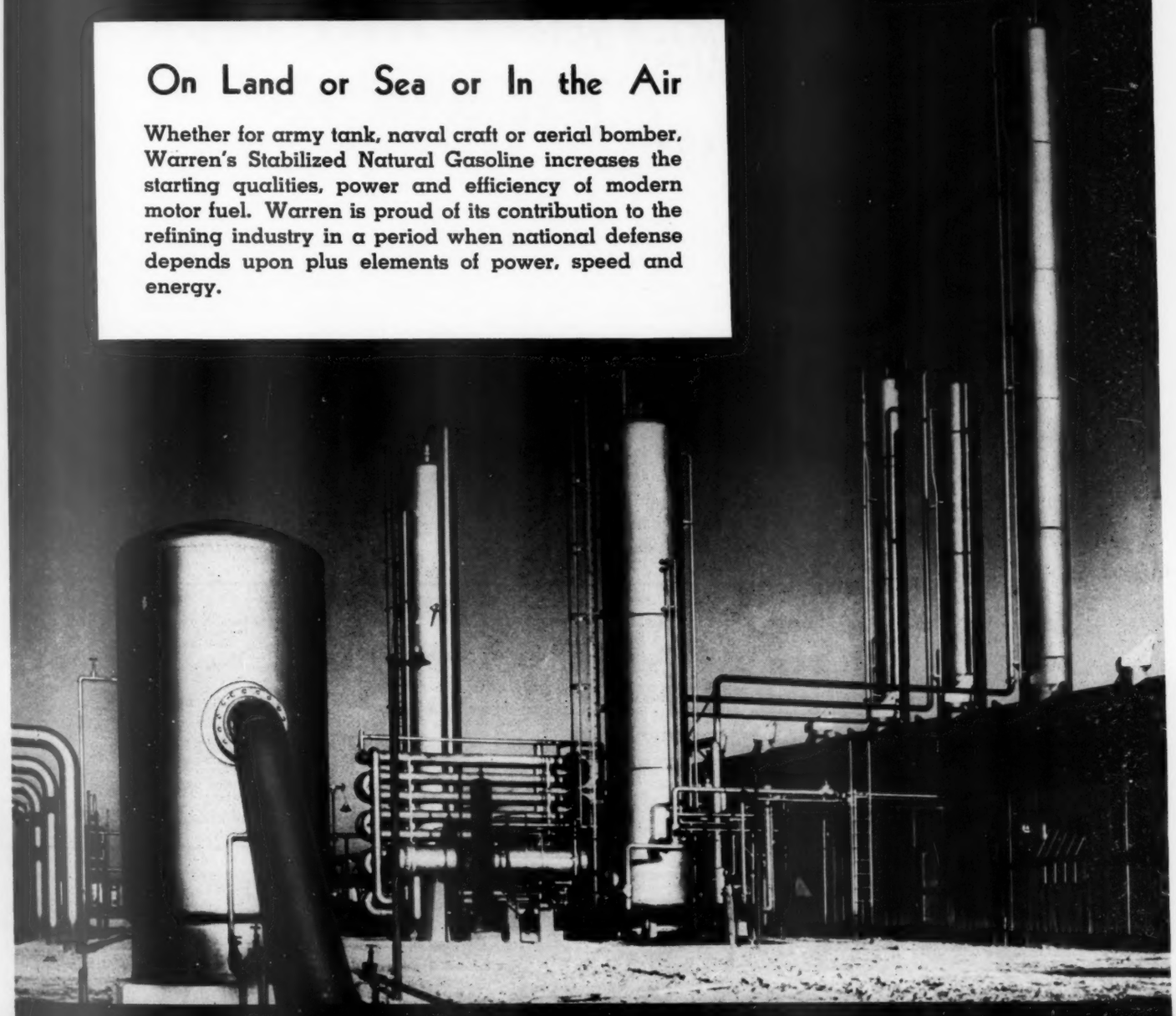
**Whether for army tank, naval craft or aerial bomber, Warren's Stabilized Natural Gasoline increases the starting qualities, power and efficiency of modern motor fuel. Warren is proud of its contribution to the refining industry in a period when national defense depends upon plus elements of power, speed and energy.**



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Tulsa, Oklahoma

Export Terminals: Corpus Christi, Port Arthur and Norsworthy, Houston, Texas, Lake Charles, La., and Marcus Hook, Pa.

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**TRINIDAD***

| | Producing wells | Daily av. prod. (bbl.) | Wells drilling | Producing depths | Gravity A.P.I. | Base of crude | Outlet | Age of field (years) |
|---|---|---|---|---|---|---|---|---|
| Lot One | ... | 6,000 | ... | 1,688-4,419 | ... | .. | .... | 31 |
| Point Fortin | ... | 6,500 | ... | 90-5,602 | 18-27 | A. | .... | 34 |
| Guapo Pool | ... | 800 | ... | ..... | ... | .. | .... | .. |
| Vessigny | ... | 620 | ... | ..... | ... | .. | .... | .. |
| Brighton | ... | 60 | ... | 100-3,622 | 13-25 | A. | .... | 34 |
| Tabaquite | ... | 30 | ... | 300-500 | 42 | P. | .... | 22 |
| Lizard Springs | ... | 10 | ... | ..... | ... | .. | .... | .. |
| Palo Seco | ... | 5,800 | ... | 100-5,373 | 21-43 | A. | .... | 32 |
| Coora | ... | 3,400 | ... | ..... | ... | .. | .... | .. |
| Point Liquore | ... | 30 | ... | ..... | ... | .. | .... | .. |
| Fyzabad-San Francique | ... | 27,500 | ... | 100-5,402 | 15-40 | A. | .... | 28 |
| Penal | ... | 1,600 | ... | 650-4,656 | ... | .. | .... | .. |
| Guayaguayare | ... | 200 | ... | 580-4,600 | ... | .. | .... | 40 |
| Barrackpore | ... | 475 | ... | 500-2,000 | 17-38 | A. | .... | 31 |
| Cedros | .... | ..... | .. | ..... | ... | .. | .... | 32 |
| Total Trinidad | .... | 53,025 | .. | | | | | |

Figures on wells not available, production estimated. Short pipe lines and refineries handle all crude.

**U.S.S.R.**

Up-to-date and complete information on operations not available. Special article in this issue (see index) discusses operating conditions.

**VENEZUELA**

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Lagunillas (State of Zulia) | 1,141 | 205,344 | ... | 2,270-4,900 | 17.4 | A. | Tankers | 16 |
| Cabimas (State of Zulia), includes Ambrosio, La Rosa and Punta Benitez | 839 | 65,493 | 2 | 800-2,800 | 22.8 | A. | Tankers | 25 |
| Tia Juana (State of Zulia) | 461 | 143,787 | 3 | 1,900-3,100 | 18.3 | A. | Tankers | 14 |
| Bachaquero (State of Zulia) | 5 | 485 | ... | 3,150-5,160 | 19.2 | A. | Tankers | 12 |
| La Concepcion (State of Zulia) | 77 | 4,405 | ... | 950-3,800 | 36.4 | M. | P.L.-Tankers | 17 |
| La Paz (State of Zulia) | 22 | 1,109 | ... | 950-3,800 | 21.0 | M. | P.L.-Tankers | 17 |
| Mene Grande (State of Zulia) | 210 | 37,379 | 2 | 450-5,000 | 19.7 | A. | P.L.-Tankers | 28 |
| El Cubo (State of Zulia) | 81 | 19,947 | 2 | 800-4,500 | 31.7 | M. | P.L.-Tankers | 12 |
| Mene Mauroa (State of Falcon) | 42 | 648 | ... | 750-3,000 | 33.9 | M. | P.L.-Tankers | 14 |
| Cumarebo (State of Falcon) | 46 | 6,305 | ... | 650-1,500 | 48.9 | P. | P.L.-Tankers | 11 |
| Hombre Pintado (State of Falcon) | 23 | 1,544 | 1 | 750-3,000 | 24.1 | M. | P.L.-Tankers | 14 |
| Quiriquire (State of Monagas) | 152 | 57,454 | ... | 2,600-3,100 | 19.3 | A. | P.L.-Tankers | 12 |
| Pedernales (Delta Amacuro) | 9 | 4,270 | ... | 5,000-6,000 | 21.3 | A. | P.L.-Tankers | 6 |
| Temblador (State of Monagas) | 59 | 6,391 | ... | 3,500-4,000 | 21.8 | A.-M. | P.L.-Tankers | 5 |
| Oficina (State of Anzoategui) | 158 | 70,162 | 10 | 3,900-6,300 | 32.0 | M. | P.L.-Tankers | 5 |
| Santa Ana (State of Anzoategui) | 1 | 735 | ... | 7,000-7,500 | 52.0 | M. | P.L.-Tankers | 3 |
| Jusepin (State of Monagas) | 68 | 19,850 | 3 | 4,150-5,150 | 32.3 | M. | P.L.-Tankers | 3 |
| San Joaquin (State of Anzoategui) | 17 | 8,290 | 3 | 6,000-6,700 | 41.5 | M. | P.L.-Tankers | 3 |
| El Roble (State of Anzoategui) | 4 | 5,165 | 2 | 8,000-9,500 | 44.7 | P. | P.L.-Tankers | 3 |
| Others | 11 | 1,676 | 12 | ..... | ... | .. | ..... | .. |
| Total | 3,426 | 660,439 | 40 | | | | | |

Note: Number of wells actually producing during September 1941. Does not include wells closed in, workover, and similar operations. Production during September 1941. Total drilling wells as of September 30, 1941.

**MISCELLANEOUS FIELDS**

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Albania: Devoli | 540 | 3,500 | ... | 1,950-2,950 | 16 | A. | P.L. | 7 |
| Bahrein Island | 72 | 15,000 | ... | 2,000-4,600 | 33.5 | M. | Ref. | 9 |
| Bolivia: Sanandita & Camiri | 19 | 460 | 1 | 700-4,800 | 41.5-52.5 | P. | Ref. | 14-15 |
| Cuba: Motembo, Bacuranao | 155 | 360 | 4 | 400-1,200 | 29-61 | M.-P. | Local | 36-61 |
| Dominican Republic: Maleno | 2 | 50 | ... | 475 | 19 | P. | Fuel | 3 |
| Kuwait: Burgan | 6 | Shut in | ... | 3,500-4,500 | 34 | M. | .... | 4 |
| Total miscellaneous | 794 | 19,370 | 5 | ..... | ... | .. | ..... | .. |


# JOHN ZINK BURNERS

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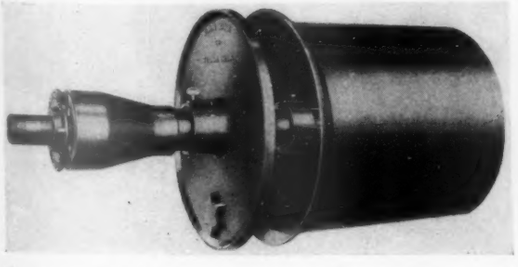

Horizontal Bi-Mix Burner for wall firing. Burns with a short flame, without excess air, refinery gases, residue gas, butane and natural gas.

Vertical Bi-Mix Burner for floor firing or oil country type boilers. Burns gases of varying heat value with a short flame.

•

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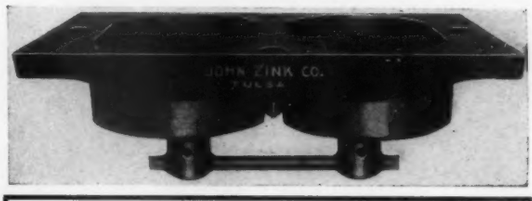


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1941

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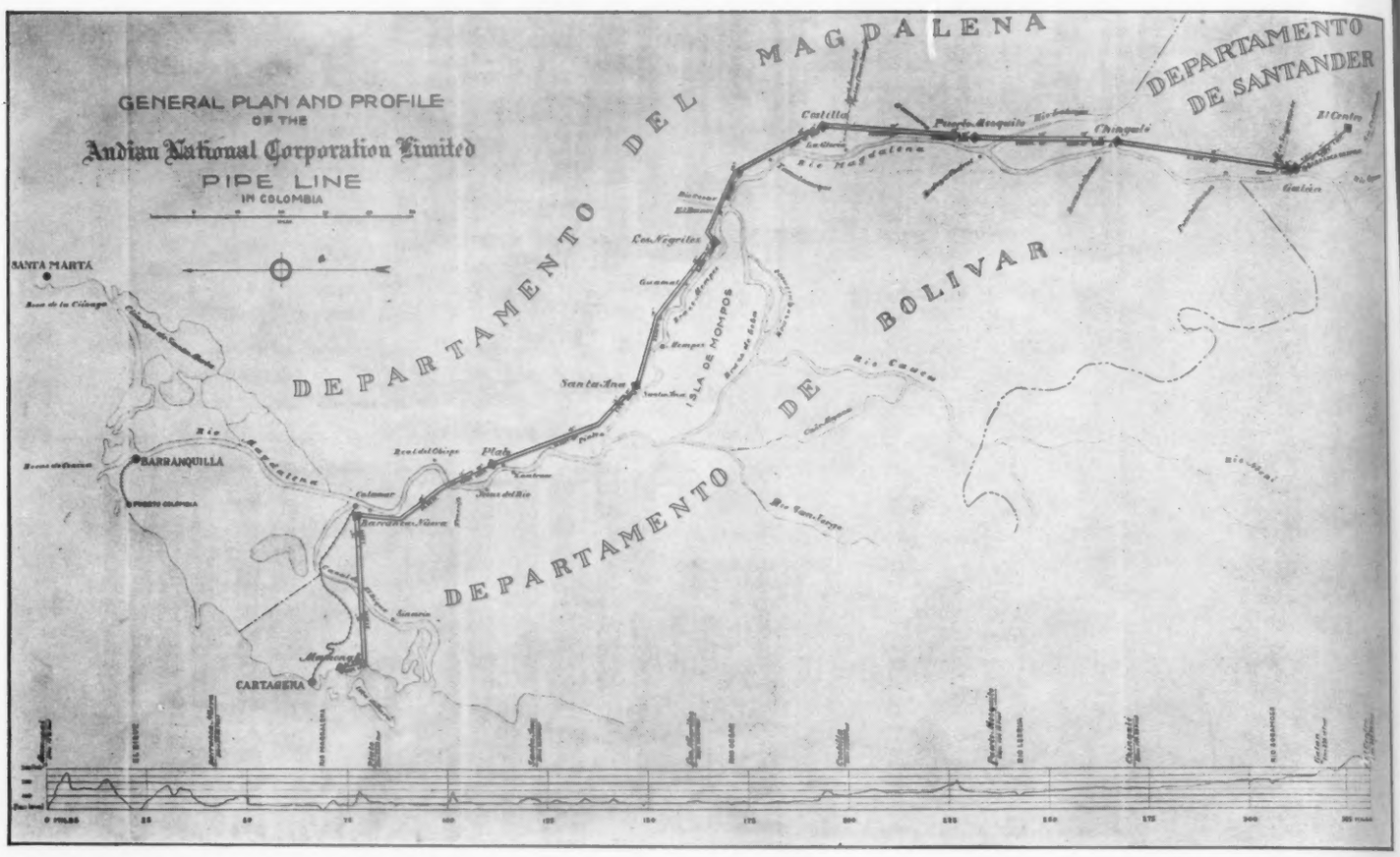



*Lowland route of Andian National Corp., Ltd.'s pipe line in Colombia presents difficult maintenance problems. Next June the line will have completed 16 years of operation*

# Colombian Pipe Line Presents Severe Maintenance Problems

*Col. J. W. Flanagan, president, Andian National Corp., Ltd., who directed construction of the Colombian line*

CARTAGENA, Colombia.—The Andian National Corp., Ltd.'s pipe line in Colombia, South America, next June will have completed 16 years of continuous and successful operation. Many millions of barrels of oil have been transported from the producing field at El Centro to tankers at the company's terminal in Cartagena, on the Caribbean Sea about 334 miles to the north.

All but 29 miles of the line have been looped. The original 10-in. line was started in 1925 and completed in June 1926, the first tanker being loaded on July 2, 1926. In 1927, 285.2 miles of 10-in. loop were added and in 1937, 20.62 miles of 12-in., making the present daily capacity of the line approximately 57,000 bbl. at an average pumping pressure of 700 lb. per sq. in. Nine diesel-powered pump stations equipped with reciprocating pumps divide the work of moving the oil to the loading station at Mamonal terminal.

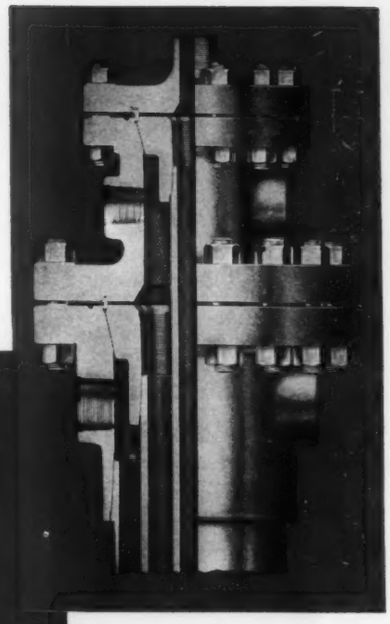
The pipe line extends from its terminal on Cartagena Bay across the savannas about 50 miles to Barranca Nueva pump station on the Magdalena River, from which point it follows the river to the oil fields at El Centro, crossing on its way the Magdalena and four separate tributaries thereof. The line does not cross any severe mountain ranges but the low swampland which forms the bulk of the right-of-way presents a difficult problem in maintenance. Over 70 per cent of the line lies under water during the rainy season and as the soil is very corrosive, extensive and continuous re-treating has been necessary up to the present time, averaging about 35 miles annually, which work must be done during the 3 months of comparatively dry weather.

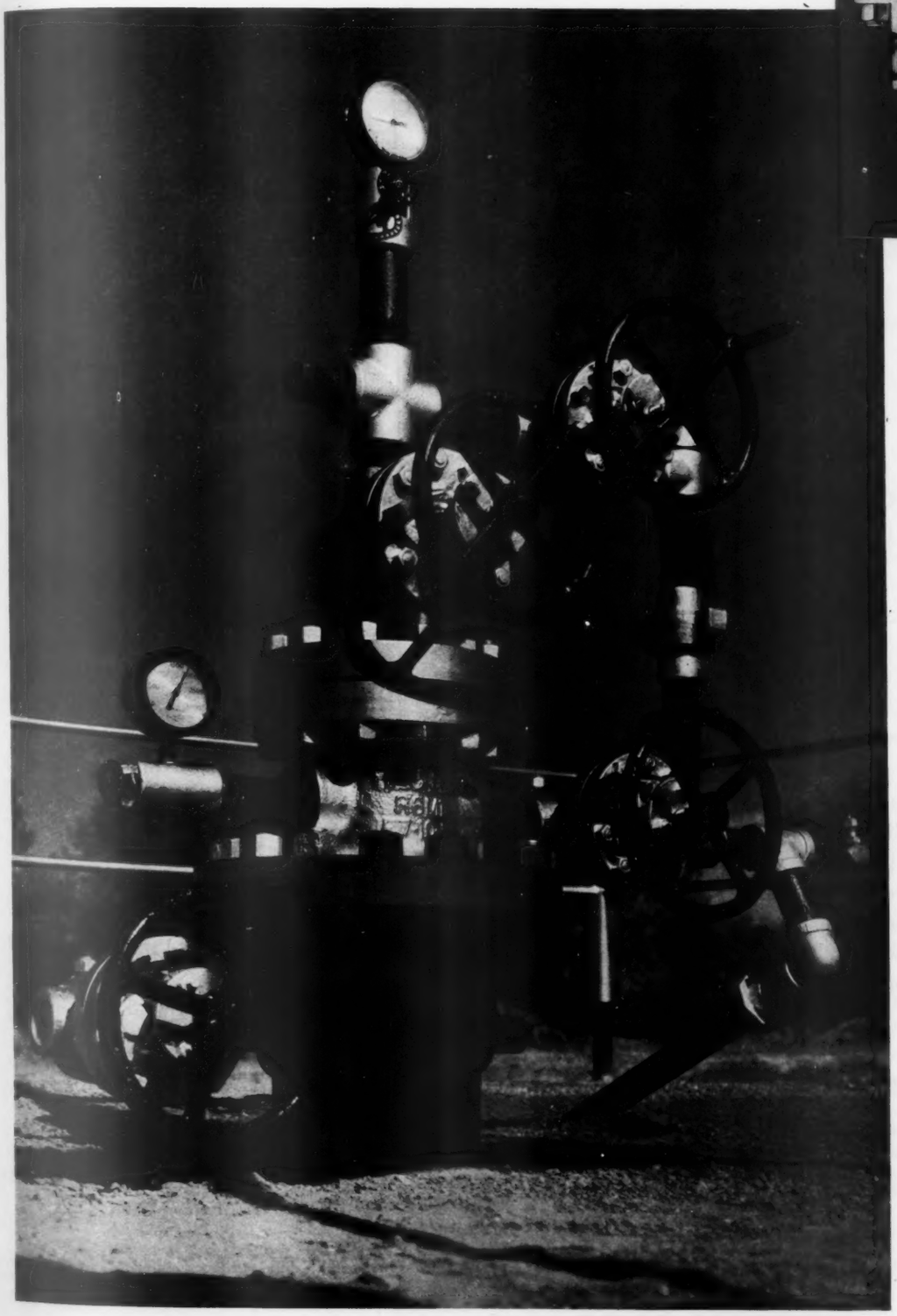
### Health Problem Attended

Going back to the original construction of the line which, under the able direction of Col. James W. Flanagan, was brought to a successful conclusion, not the least of the many problems confronting the enterprise was the question of adequately protecting the health of the workmen. Houseboats equipped with running water, baths, sanitary toilets, refrigerators, electric fans and screened quarters, were used as camps which could be moved along the Magdalena River as the work progressed. All drinking water was filtered and boiled. Fresh food was supplied regularly by boats. Each houseboat had a doctor who not only maintained a high standard of sanitation but was always available to render medical assistance in cases of sickness or accident.

During the rainy season when the Magdalena overflowed its banks, some of the pipe already strung along the right-of-way lay under several

# SAFE STRONG COMPACT DURABLE





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This casing head-tubing head combination, aside from having the usual advantages offered in other heads, provides the following *exclusive advantages:*

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5. Use of iron ring only makes anchor rods and clamps unnecessary.

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*Operation of the pipe line is directed from this company building at Cartagena*

*This hospital for employes is maintained at Mamonal, Colombia*


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feet of water. It was no easy task to lift this pipe, joint by joint, up to the pipe-laying machine, itself partially submerged. As long as the magnetos could be kept dry and above water, the work went on.

This flooding of the lowlands still constitutes a distinct hazard in maintenance. Fortunately there have been very few serious breaks of the line. One of these, which occurred under some 8 ft. of water, will illustrate the difficulties in such repair work. Special chain hoists had to be rigged up and transported by shallow-draft barge to the spot as the depth of the water prevented the use of tractor or mule. The pipe was elevated above the water on trestles and the repairs effected with the pipe in that position. On another occasion a cofferdam was built, the water pumped out and repairs then made by welding, a tedious and expensive operation.

A system of constant inspection based on operating hours is maintained on all pumping machinery at the stations. Overhaul of an engine is never started until all necessary spare parts are on hand and inspections which involve taking down part of an engine are regulated so that not more than 3 hours would be needed to put the unit back on the line if necessary.

The Andian National Corp., Ltd., has in its employ at present some 761 Colombian nationals and 74 foreigners. Colombians with mechanical aptitude and a desire to learn were placed at the various stations as apprentices. Some of these men are now chief engineers in charge of stations as at El Centro and Barranca Nueva. Others are assistant chief engineers and shift engineers and have proved their capability. Additional Colombian apprentices are added from time to time and these step up as other promotions are made. Colombian nationals have been trained in pipe-line repair work, the majority of the welders at present being of that nationality. Colombians, although for the most part inexperienced in the construction and operation of a pipe-line back in 1925 when the work was first started, have shown that they possess the ability and desire to learn and master with patience and diligence the intricacy of operation and to prove their capability of assuming responsibility.

There follows a brief statistical summary of the company's installations:

There are nine main-line pump stations and a loading terminal, which are equipped as follows:

**El Centro station.**

Four 260-hp. De la Vergne diesel engines direct-connected to four Prescott pumps (5½ by 24 in.).

**Galan and Barranca Nueva stations.**

Three 500-hp. De la Vergne diesel engines direct-connected to three Prescott pumps (6¼ by 24 in.).

**Chingale, Puerto Mosquito, Costilla, Los Negritos, Santa Ana and Plato stations.**

Two 500-hp. De la Vergne diesel engines direct-

connected to two Prescott pumps (6¼ by 24 in.).

Two 200-hp. De la Vergne diesel engines direct-connected to two National Transit pumps (5½ by 24 in.).

**Mamonal terminal.**

Four 260-hp. De la Vergne diesel engines direct-connected to four Prescott loading pumps (11½ by 24 in.).

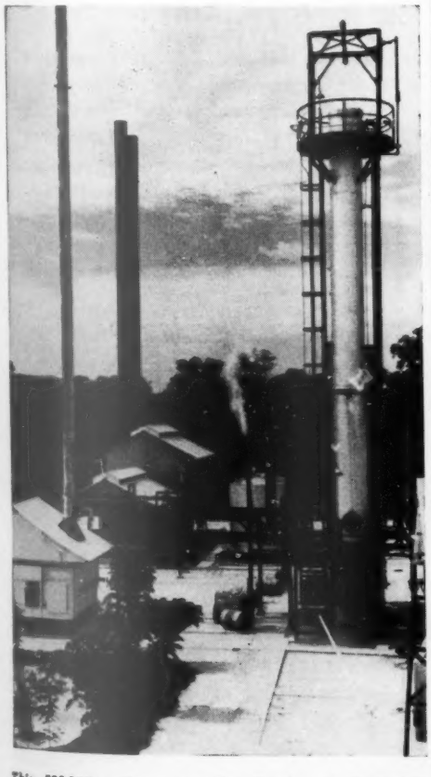
A loading berth is provided for mooring and loading tankers in Cartagena Bay and an average loading rate of 9,000 to 10,000 bbl. per hour can be maintained.

The following storage is available: Mamonal terminal, fifteen 80,000-bbl. tanks; Galan station, one 59,200-bbl. tank; El Centro station, three 80,000-bbl. tanks; all other stations, each, two 31,200-bbl. tanks.

All stations are equipped with generators, ice plants, domestic water systems with chlorinators, office building, warehouse, residences for families, bachelor quarters and mess halls, all modern construction. All stations have first-aid station and two doctors constantly travel on the pipe line to give first-aid treatments and administer to the sick and injured.

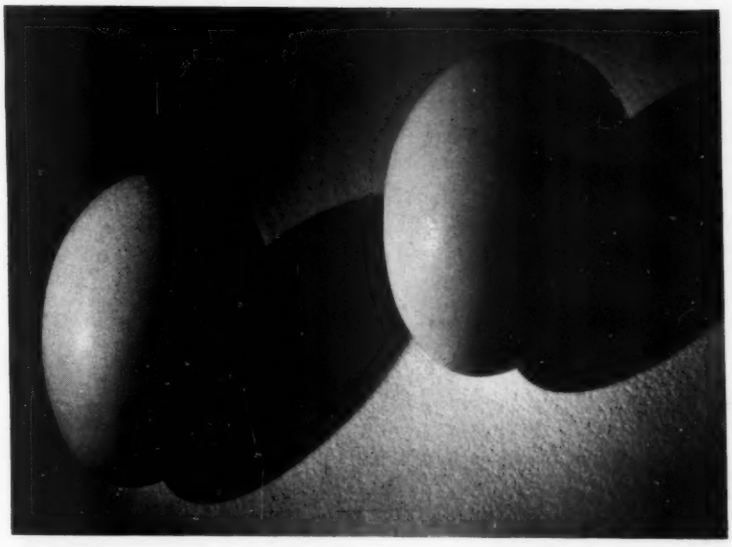
### Colonel Flanagan Guides Operations

Over the entire operation of the company from its inception has been the guiding hand of its president, Colonel Flanagan. His sympathetic understanding and cooperation with the Colombian Government and the many municipalities through which the pipe line passes have been the principal reasons the company has maintained such splendid relations and enjoyed the friendship and hospitality of this democracy. In recognition of his untiring service in the public welfare, the Colombian Government, several years ago, bestowed upon Colonel Flanagan the "Cruz de Boyaca."



*This 500-bbl. refinery supplies local and Colombian Petroleum Co. demand on the Barco concession*

*This pump station at Barranca Nueva is typical of those along Andian's line*

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## ...for the world's life-blood

● LOCATING PETROLEUM deposits, and getting them to the surface, is an art which taxes man's utmost ingenuity and resources. But even then the battle is only half won. Crude oil is still of little value unless it can be transported from the wells quickly and in quantity, at reasonable cost. Petroleum must travel far, undergo major transformations, before it emerges in all its myriad usefulness.

To perform this essential task, the petroleum industry has developed an ingenious system of "metal veins," or pipe-lines. Through them, impelled by the steady throb of "hearts," or pressure pumps, crude oil courses swiftly to refineries and points of distribution. Buried in almost impenetrable jungles... under arid deserts ... this flow pulses day and night, unseen and unceasing.

Pipe-lines are bonds of service that link nations and peoples. Because of the "life-blood" they forward, motor cars are greased in Chile, cattle are sprayed in Argentina, paints are mixed in Brazil, roads are repaired in Central America and the West Indies. Daily the benefits of petroleum are extended. Daily more thousands throughout the Americas enjoy the progress it makes possible.

Many of these "metal veins" have been pioneered by the Esso Organization, perhaps best known to you by the white-red-and-blue oval sign of its service stations and dealers.

**STARTING JANUARY 1st,** *America's favorite radio news program, "The Esso Reporter," offering the latest United Press news, will be broadcast four times every week-day over leading local stations in Puerto Rico, Dominican Republic, Venezuela, Panama, Costa Rica, Nicaragua, El Salvador and Guatemala. It is already on the air in Cuba, Argentina, Brazil, Chile and Uruguay. Consult your local newspaper for stations and times.*

# VENAS DE METAL
## ...¡la vida de la civilización!

● EL LOCALIZAR y llevar a la superficie los depósitos de petróleo es arte que impone máximas exigencias a la inventiva y a los recursos del hombre. Y, aun así, no está ganada toda la batalla. El petróleo crudo tiene escaso valor a menos que pueda transportársele desde los pozos rápidamente, en cantidad y a costo razonable. El petróleo viaja largamente y sufre grandes transformaciones antes de surgir en sus múltiples formas de utilidad.

Para realizar esta tarea esencial, la industria petrolífera ha creado un ingenioso sistema de "venas de metal," llamadas oleoductos. A través de éstos, impelido por la palpitación constante de "corazones" o bombas de presión, el petróleo crudo va a las refinerías y los centros de distribución. Enterrado en selvas casi impenetrables, pasando debajo de áridos desiertos, fluye día y noche, invisible, incesante.

Los oleoductos son vínculos de servicio que unen entre sí a naciones y pueblos. Gracias a ellos, se engrasan automóviles en Chile, se desinfecta el ganado en Argentina, se mezcla pintura en Brasil, y se componen carreteras en Centroamérica y en las Antillas . . . A diario se amplían los beneficios derivados del petróleo. A diario aumentan, por todo el continente, los miles y miles de personas que gozan del progreso resultante.

Muchas de estas "venas de metal" han sido instaladas primero por Esso, que identifican los óvalos blancos, rojos y azules de sus distribuidores y estaciones de servicio.

**A PARTIR DEL PRIMERO DE ENERO** *el radionoticiario predilecto de América—El Repórter Esso—que trasmite las últimas noticias del servicio de la United Press, será radiado cuatro veces al dia, durante toda la semana, excepto los domingos, por las estaciones locales radioemisoras de Puerto Rico, la República Dominicana, Venezuela, Panamá, Costa Rica, Nicaragua, El Salvador y Guatemala. Esta radiodifusión ya está haciéndose en Cuba, la Argentina, Brasil, Chile y Uruguay. Consulte Vd. los periódicos para saber por qué emisoras y a qué horas se radian dichos programas.*

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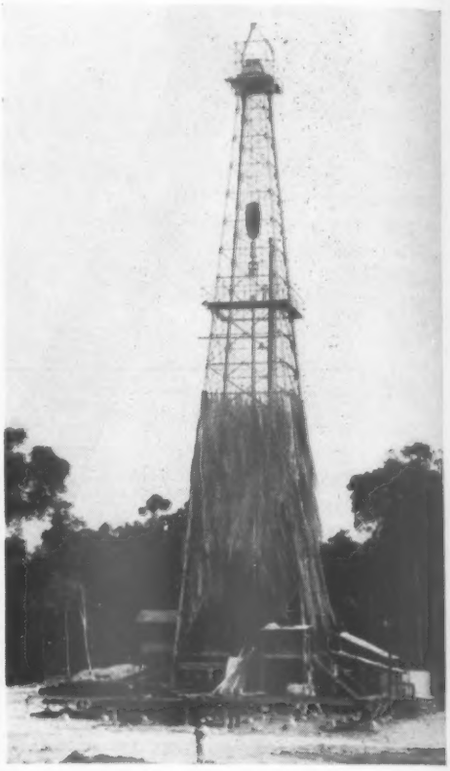
# Cretaceous Tested West Of Petrolea Production

THE Barco oil concession, the granting of which to the Colombian Petroleum Co., was officially authorized by Law 80 of 1931, lies in the northeastern portion of Colombia, bordering Venezuela. The Colombian Petroleum Co. carries on the producing operation and an affiliated company, the South American Gulf Oil Co., operates the pipe line.

The presence of active oil seeps at La Petrolea interested Don Virgillio Barco, who applied for the original Barco concession. Sr. Barco installed a small still on the concession in 1906 for the purpose of refining the oil collected from the surface seepages. The refined products were transported to Cucuta, about 70 km. (43½ miles) away, on muleback.

Intensive geological work was not carried out until July 1931. The first drilling rig was moved into the Petrolea area in January 1933. The second rig was added in 1934. The number of rigs increased to four in 1937.

All heavy materials were transported originally to the concession on the waterway through Lake Maracaibo and up the Catatumbo and Tarra rivers. Communications with Cucuta were maintained only by rail and mule. Transportation was carried on in the field by means of a 24-in. gage railroad and by mules. Transportation facilities have been improved by the construction of a road connecting the company's field railroad with



*Rotary drilling Colombian Petroleum Co. 2-A Tres Bocas seeking Cretaceous west of Petrolea*

the railroad running between Cucuta and Encontrados, Venezuela. The rivers are still used for the transportation of the major amount of heavy equipment. Airplanes are also being used currently for the transportation of men and materials from Cucuta and Barranquilla to the pipe line and producing operations.

### North Dome Major Area

Development operations on the Barco concession were increased so that a total of 12 rigs were in operation in March and April of 1940. The Petrolea North Dome is the major producing area on the concession today with 101 operating wells. In addition, one small well is producing at Petrolea South Dome and two small wells are producing at Carbonera. Production from the concession during 1939, 1940, and 1941 is given below:

| Year— | Production in barrels: Total | Production in barrels: Daily average |
|---|---|---|
| 1939 | 1,578,281 | 4,324 |
| 1940 | 4,207,770 | 11,497 |
| 1941 (9 months) | 3,298,915 | 12,084 |

One rig is now occupied in drilling a southern edge well in the Petrolea field. Colombian Petroleum 1 North Sardinata, a wildcat well, is now drilling to test the Tertiary sands expected at a depth of about 4,200 ft. Socuavo 1 encountered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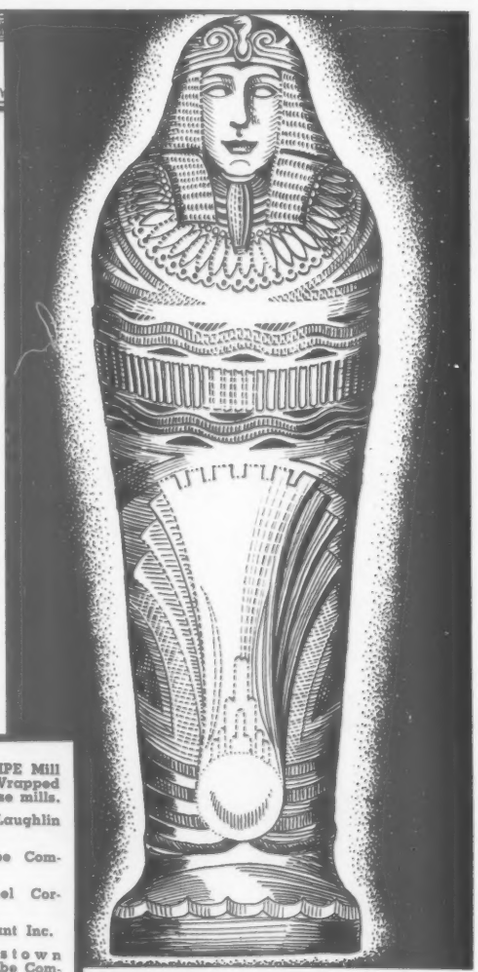

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metamorphics at 9,850 ft. and is now testing Upper Cretaceous limes. Tres Bocas 2-A is drilling at about 6,030 ft. and will test the Cretaceous formation. This will be the second well to test the Cretaceous formation in the basin west of the Petrolea field. Production at Petrolea comes from these Cretaceous formations.

Tertiary sands, known locally as the Barco sands, have been tested in Tres Bocas 1, Socuavo 1 and South Sardinata 1, and proven noncommercial. The Carbonera wells produce from small stringers of sand in the Tertiary. Noncommercial production in the basal Tertiary sands has also been found in the Rio de Oro field, located at the northern end of the concession.

Surface mapping, seismic work and the core drill have been intensively utilized in preparation for the present testing program.

The Colombian Petroleum Co. has installed a small refinery on the concession. This refinery supplies gasoline and diesel fuel oil to the Cucuta market and to the concession. A 3-in. gasoline line delivers gasoline to the rail head at Puerto Leon where delivery is made to tank cars.

The South American Gulf Oil Co.'s 12-in. pipe line, from the Barco concession to Coveñas on the west coast of Colombia about 100 miles south of Cartagena, was completed in October 1939 and the first Barco crude to reach the coast in quantity for marketing was November 1, 1939.

### Three Booster Stations

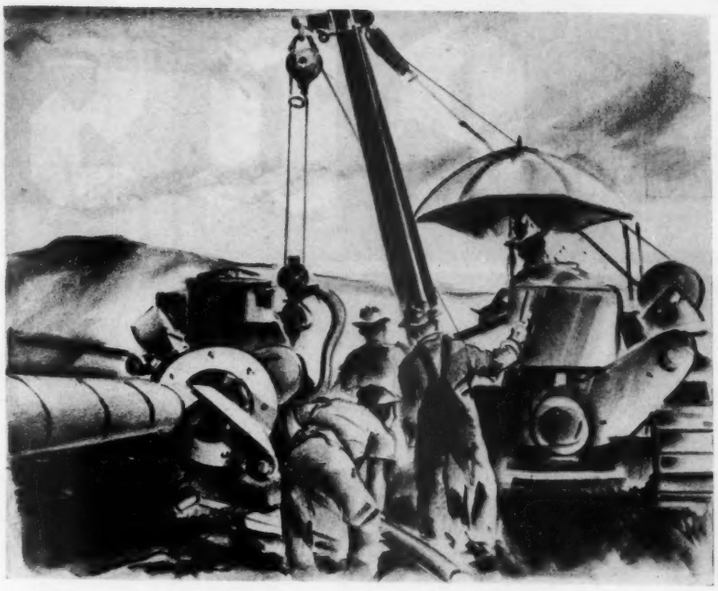
Facilities for boosting the oil through this 263-mile pipe line consist of three pump stations all east of the divide which rises to an elevation of 5,300 ft. where the line crosses. Each of the three pump stations consists of two high-speed centrifugal pumps driven by 750-hp. diesel engines through speed increasers. Each of these pumps is capable of handling 1,000 bbl. per hour. The unusual feature about the Barco pipe line in comparison to other lines is that the third and last pump station toward the coast is 191 miles from the ship loading terminal. This No. 3 pump station is about 7 miles from the divide or highest point on the line, from where the oil flows by gravity a distance of about 184 miles to Coveñas terminal in the Department of Bolivar.

The pipe line passes from rugged mountainous country in the eastern section to miles of lowlands along the Magdalena River in the western and coastal sections. Many miles of the lowlands are flooded for at least half of the year.

In addition to the crude storage at the field and terminal ends of the line there are oil-fuel stocks for the requirements of the Coveñas terminal.

Pumping operations at the terminal, from shore to tankers, are carried out by three 225-hp. diesel engines geared through speed increasers to centrifugal pumps. Maximum rate of delivery to ships is 17,000 bbl. per hour through a 20-in. discharge line to the loading dock. Average size vessels, that is, of the 110,000-bbl. class, receive 90 per cent of their cargo at the dock and are "topped-off" with the remaining 10 per cent in deeper water with the aid of a tug and barge. Preparations are being made to lay an underwater line to a point about 3,000 ft. off shore where the draft is great enough to load any tanker.

Runs through the Barco pipe line amounted to 1,140,813 bbl. for the last 2 months of 1939 after the project was put into operation. In 1940, 3,964,921 bbl. of Barco crude reached the seaboard and deliveries to Coveñas terminal through the pipe line for the first 9 months of the present year amounted to 2,825,376 bbl. The great majority of crude oil loaded on board ships from the South American Gulf Oil Co. pipe line goes to markets in the Americas.

"COATING AND WRAPPING" from a lithograph by E. M. Schiwetz

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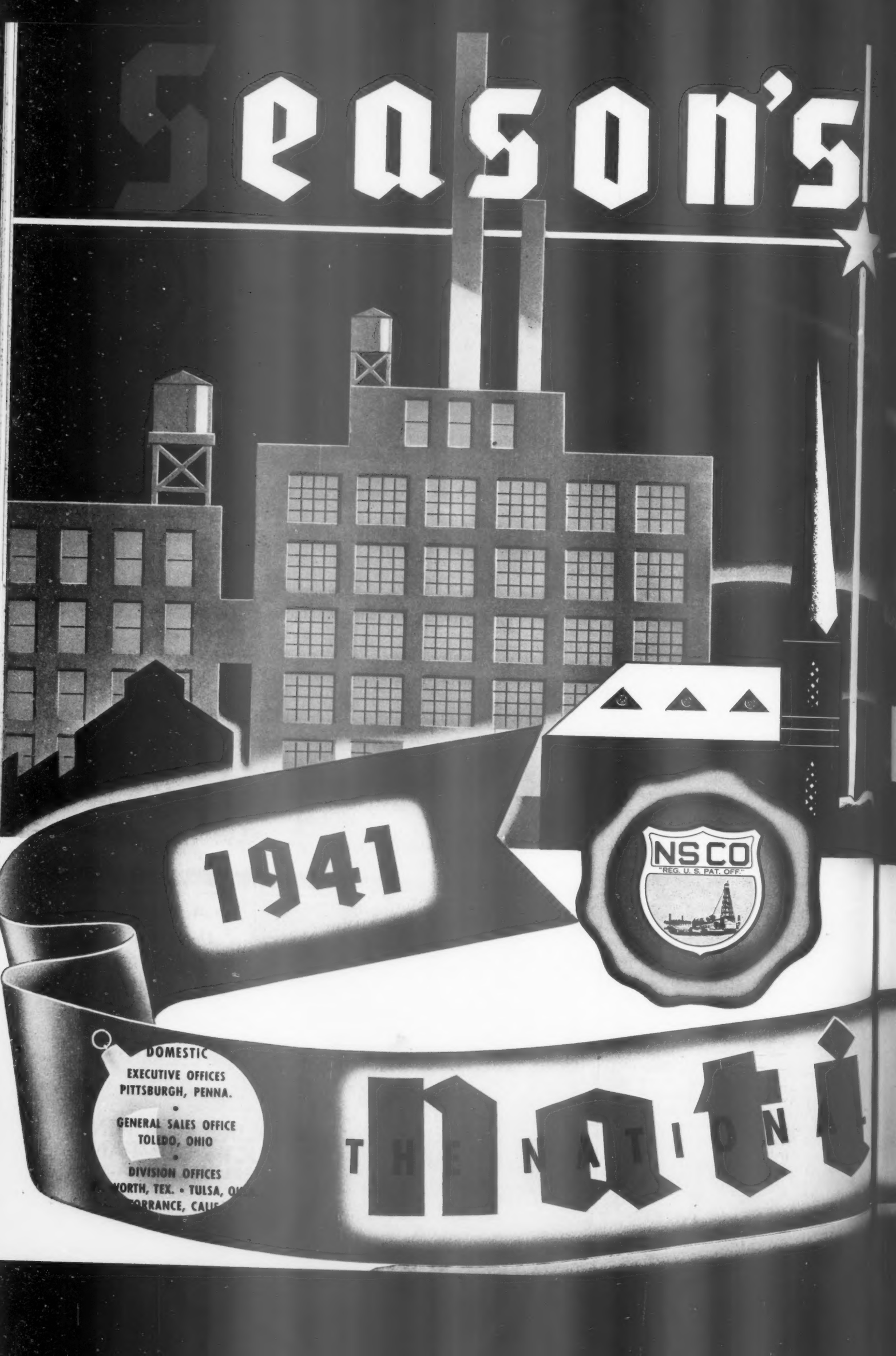
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# Clark Bros Co.

# Blue Goose Development May Open Amazon Industrial Era

By T. P. SANDERS

FOR more than a decade, a far-sighted group of Californians has been engaged in what is perhaps the most hazardous pioneering adventure ever undertaken by the American oil industry. Now, after years of constantly-growing investment, after serious setbacks such as occurred when hundreds of tons of drilling tools were lost in the Amazon River, the final step is under way of the project that can be expected to inaugurate industrial development of the upper Amazon Valley in Peru.

The Compania de Petroleo Ganso Azul (Blue Goose Oil Co.) is erecting a 300-bbl. straightrun refinery on their Agua Caliente concession in the Peruvian jungles at the headwaters of the Amazon, thereby providing the first commercial outlet for the oil production discovered in 1939.

Although the campaign of prospecting and development carried out by Ganso Azul has been well planned and systematically carried out, its story is not lacking in color.

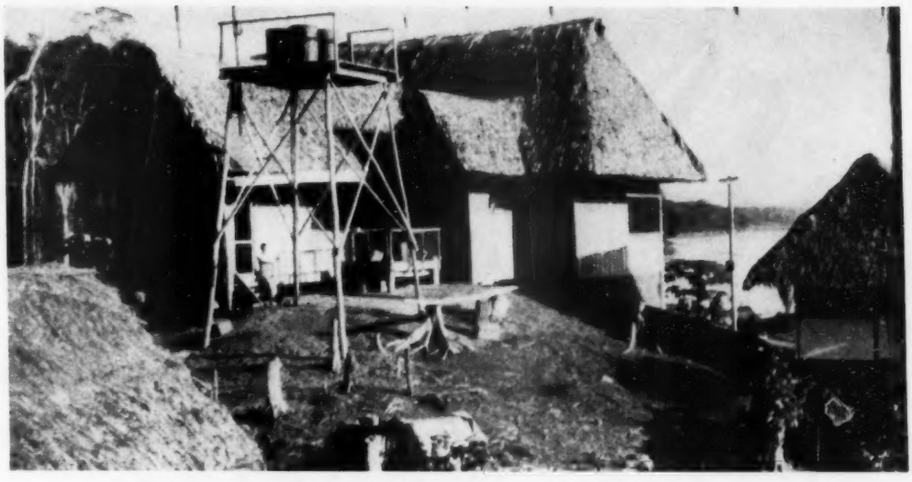
Twelve years ago this month Robert B. Moran, nationally known consulting geologist and engineer of Los Angeles, was making a survey of the Peruvian back country for Selden-Breck Construction Co. of St. Louis. This firm was interested in the financing and construction of a proposed railroad from a port on the Ucayali River over the Andes to the Pacific Coast. Topographic considerations made it necessary for Moran to report unfavorably on the proposed railroad since the climb of 15,000 ft. in a comparatively short distance made construction of a highway a more attractive alternative. But while flying by the National Air Lines service from San Ramon to Iquitos, Mr. Moran made some observations on geology.

After his graduation from Stanford University in 1907, Mr. Moran spent many years in geologic field work. He thus was quick to recognize in the jungle below him a great structural dome. A prominent topographic feature was completely surrounded by an outcrop of whitish rim rock. An aerial photograph would probably have been sufficient for all preliminary promotion purposes, but Mr. Moran decided to take an expedition into the jungle depths to obtain more comprehensive geologic information.

### Type of Country

The structural feature sighted by Moran is located 9° south of the Equator and approximately 75° west of Greenwich. Its highest point is 6 miles west of the Rio Pachitea and about 10 miles from the point in which the Rio Pachitea empties into the Rio Ucayali, an Amazon tributary. Being the longest navigable tributary, Rio Ucayali might well be considered the main artery of the Amazon. At Agua Caliente, a river port built by Ganso Azul on their concession, the Pachitea is still a big river, being about the size of the Ohio River at Louisville.

In spite of the fact that Agua Caliente is 2,800 miles upstream from the Amazon mouth, it has little elevation. In the past the Peruvian Government had defined the area as being not more than 500 ft. above sea level, but work carried on by Ganso Azul indicates an elevation of about 1,000 ft., which seems more reasonable.



*Part of the Ganso Azul Compania de Petroleo camp showing view of the river from staff house*

The entire Amazon Valley is jungle-covered, and is particularly heavy in the vicinity of the Agua Caliente concession. Here the large trees reach heights greater than 150 ft. and aerial photographs show that the spread of foliage on individual trees often has a like measurement.

The dense foliage of the tree tops prevents the sunlight from penetrating to the floor of the jungle, except within a narrow range along each river where the undergrowth becomes almost impenetrable.

Thus the inhabitants along the rivers of the

*(Continued on Page 139)*

# Mexico's Oil Production Suffers Further Decline

RESULTS of the negotiations now under way for final settlement of the petroleum-expropriation issue between private oil companies and the Mexican Government, with the U. S. Department of State a third party, will be the determining factor in the immediate outlook for the industry in that country.

**Details on Mexican producing fields, including the number of wells in each, the number of drilling wells, daily average production by fields, and pay depths are reported in the world survey of fields. Operating details on Mexican refineries are reported in the refinery survey.**

Operation of all Mexican Government and expropriated property continued this year under the direction of Petroleos Mexicanos, the national company. Next March 18 will be the fourth anniversary of the Cardenas decree expropriating private oil companies which climaxed a dispute of long standing between the concerns and Mexican labor syndicates whose severe wage and social demands were upheld.

The expropriated companies went on record in October as being unfavorable to the plan proposed by Secretary of State Hull. Terms proposed included a token payment by Mexico of $9,000,000 which is to be held in escrow until an impartial board of engineers submits appraisals.

Since the proposed settlement was submitted to the companies and since they registered disapproval, noncontingent issues of the World War have become a factor. Insistence on hemispheric solidarity eventually may exert a greater pressure for settlement of the Mexican oil controversy than now appears on the surface of the negotiations.

Without benefit of adequate finance and modern equipment, the Mexican oil properties have suffered some deterioriation during the past few years. Drilling operations have suffered a decline of more than 75 per cent since 1934. Completions this year will approximately equal those of 1940 which totaled 44. The average during the 3 years

*(Continued on Page 150)*

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upper Amazon jungles are, to a large extent, products of the rubber-boom melting pot, representing mixtures of the native tribes, Spaniards,

*Robert B. Moran, Los Angeles, Calif., is president of Ganso Azul Compania de Petroleo which is developing the Agua Caliente concession in the interior of Peru*

Portuguese and other nationalities, while the jungle depths are very sparsely populated by natives. The river people are adept at all types of manual labor and are quite easily trained for skilled labor, such as tractor driving. However, the immensity of the task undertaken by Ganso Azul can best be realized by considering the one phase of development which called for seeking out the necessary operating personnel among a people of jungle background in one of the world's little-known areas and converting them to workers in a highly specialized modern industry.

### History of the Concession

After 4 years of exploratory and preliminary work carried on by Mr. Moran, Dougles Fyfe, and Glenn M. Earl, the Selden-Breck firm was awarded a 90,000-acre concession on reasonable terms, the oil rights to extend for 25 years. In 1937 this concession was transferred to California interests and the Peruvian company, Cia Petroleo Ganso Azul, Ltda., was formed with headquarters at Lima. The board of directors are Dr. Hernando de Lavalle, attorney; Bernard Pellny, a contractor; and A. N. Mackenzie, of Lima; and Robert B. Moran, William C. McDuffie, James R. Page, and A. B. Ruddock, all of Los Angeles. Mr. Moran is now president of the firm, while A. N. Mackenzie is vice president and general manager in Peru.

During the early exploratory work carried on by Mr. Earl and Mr. Fyfe, when there was no camp and no landing, work of any type was difficult. Even surveying presented great obstacles. Without benefit of bench marks or previous survey data, location of the concession had to be described with great accuracy to avoid the possibility of leasing the wrong parcel. Using a theodolite and a method of astronomical observation proposed by the American Geographical Society, ground positions were fixed with probable error not exceeding 100 ft.

Men and equipment were forced to enter the concession from opposite sides of the South American Continent. Men went in from Lima, using a combination of railroad, automobile, and airplane transportation to make the trip in an average of 2 days. All equipment was sent out of New York, being reloaded on river steamers at Para, Brazil.

From Para the course lies up the Amazon, the Rio Solimoes, the Rio Ucayali, and finally along the Rio Pachitea to the concession's river port of Agua Caliente. Here, even in the dry season,

*(Continued on Page 142)*

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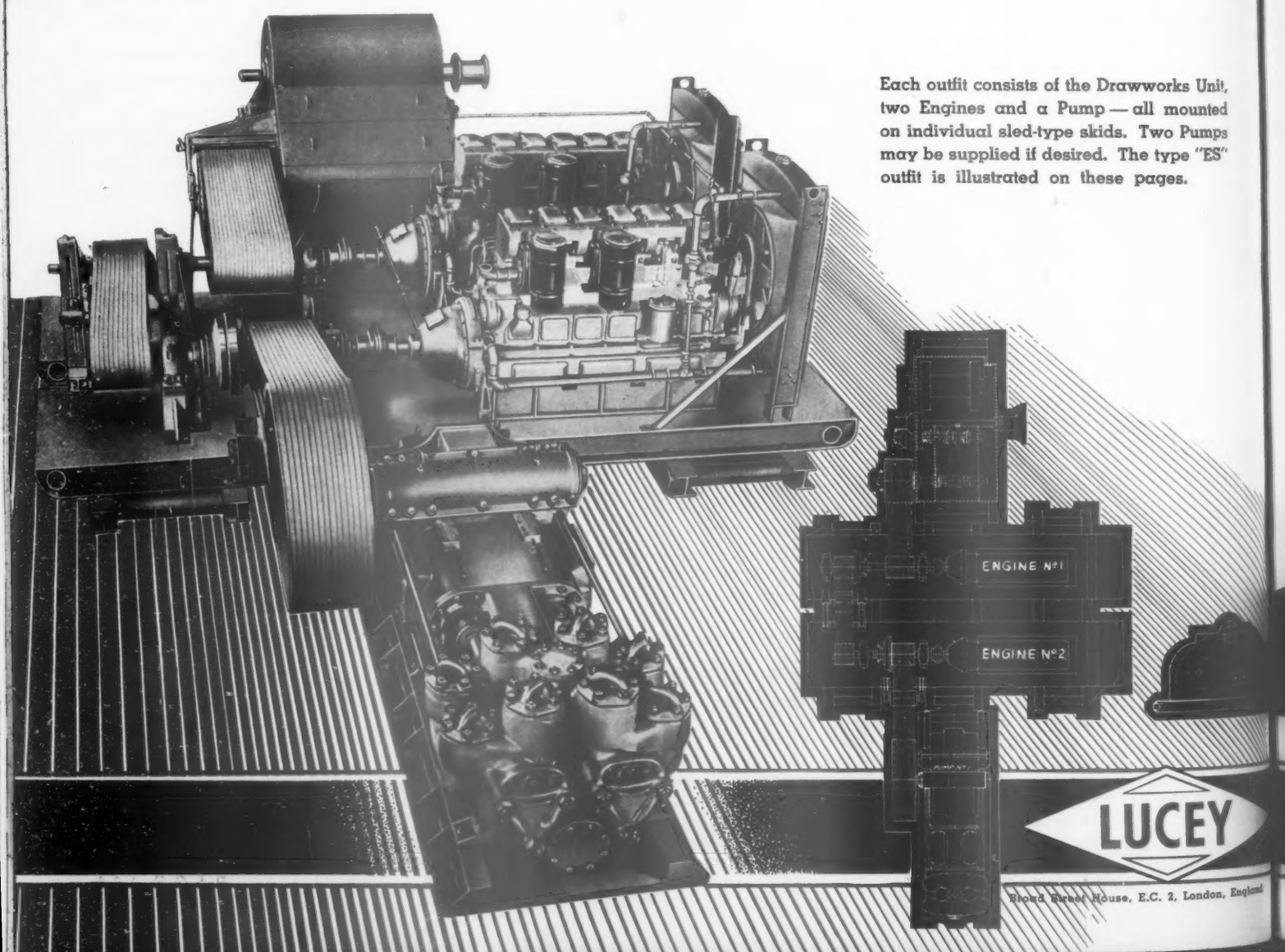
TYPE "B"—2,000 ft. to 3,000 ft.
TYPE "C"—3,000 ft. to 4,000 ft.
TYPE "D"—4,000 ft. to 5,000 ft.
TYPE "E"—5,000 ft. to 7,000 ft.

When an "S" is added to above types, it indicates that the outfit is supplied with a Sand Reel built in as part of the Drawworks Unit. Sand Reel is optional.

All four types are identical in general design. The outfits for shallower drilling are lighter in construction, have fewer Texropes, smaller drums, bearings and other dimensions. Engines of smaller horsepower are used and the slush pumps are smaller.

Not just overrated portable drilling machines. These LUCEY Slim Hole Drilling outfits give smooth, high-powered performance far in excess of their conservatively rated capacity. Simplicity is the basic feature. There are no unnecessary gadgets. All the helpful features that years of manufacturing and operating experience could conceive have been incorporated in this engineered drilling outfit. Write today for specifications and prices.




Each outfit consists of the Drawworks Unit, two Engines and a Pump — all mounted on individual sled-type skids. Two Pumps may be supplied if desired. The type "ES" outfit is illustrated on these pages.

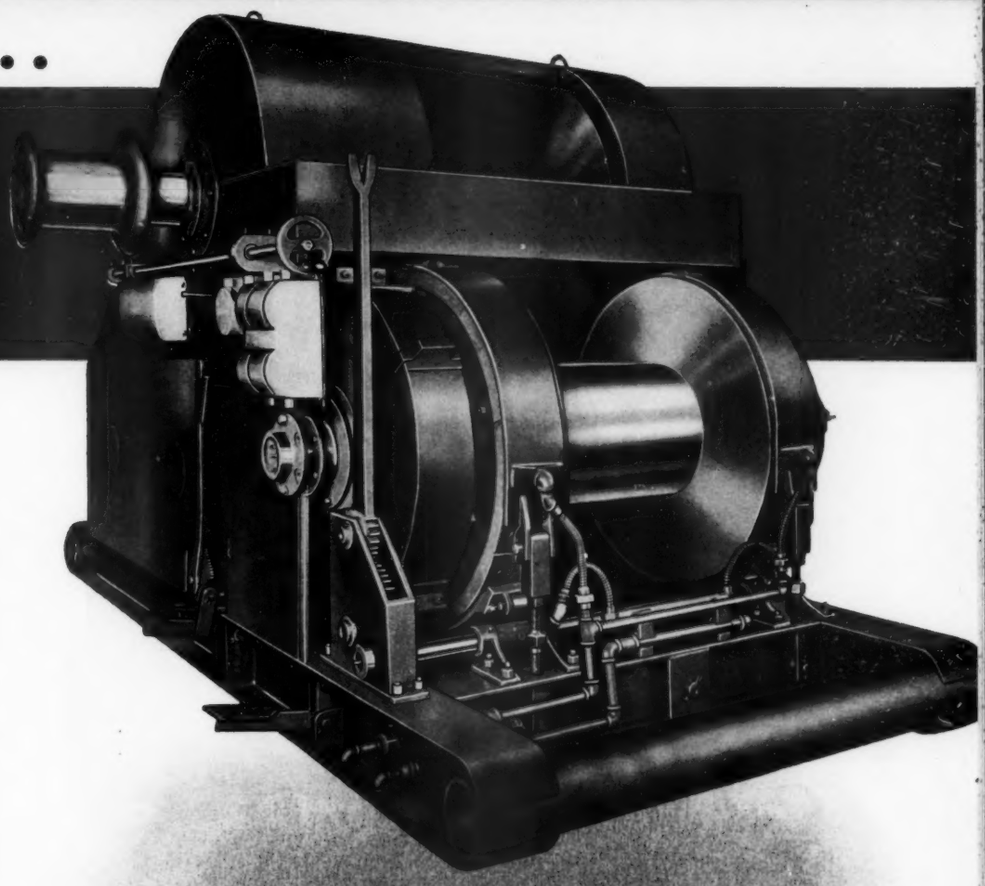
LUCEY

Bloud Street House, E.C. 2, London, England

# RESERVE POWER

## COMPACT...

## DIESEL DRILLING OUTFITS



DRAWWORKS Units are roller bearing throughout. Friction Clutches where desirable for smoother power take-off. Drawworks equipped for manual control, but may be arranged for air control if so ordered. Hoisting Drum is of cast steel construction, four speeds, with circulating water-cooled brakes. Bailing Drum is mounted on American Roller Bearings and has Friction Clutch drive.

ATTRIDGE REVERSING PULLEY supplied as standard practice on all LUCEY Slim Hole Drilling Outfits, unless ordered otherwise. Reversing mechanism is contained inside Texrope sheave and is operated from driller's position in conjunction with the two-engine control.

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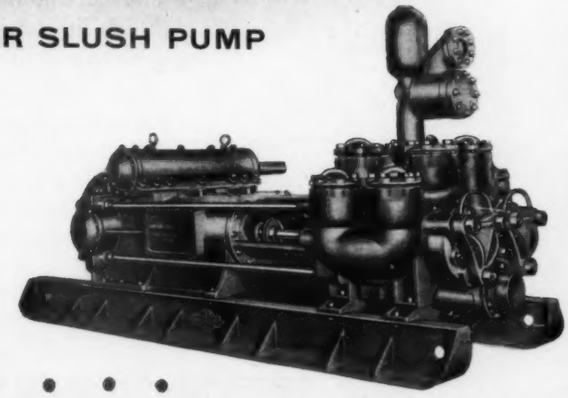
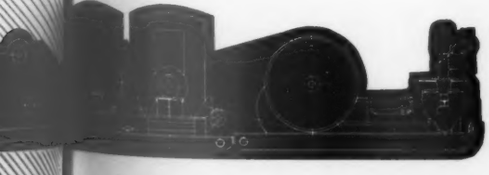
| | | | |
|---|---|---|---|
| Bailing Lines | Diesel Electrical Hookups | Pipe Reconditioning Equipment | Slim Hole Outfits |
| Boilers | Drawworks | Power Pumps | Steam Slush Pumps |
| Boiler Insulating Casings | Drilling Engines | Pull Rods | Steel Derricks |
| Cable Tool Drilling Lines | Drilling and Fishing Tools | Reverse Clutches | Steel Tanks |
| Casing Lines | Elevators | Rotaries | Sucker Rods |
| Complete Drilling Rig Installations | Gas Burners | Rotary Drilling Lines | Swivels |
| Crown Blocks | Welded Steel Casing | Rotary Drill Pipe | Tongs |
| Diesel Mechanical Hookups | Line Pipe | Seamless Steel Casing | Trailers |
| | Oil Well Cables | Separators | Traveling Blocks |
| | Oil Well Tubing | Shale Shakers | Turbo Generators |
| | | | Wire Rope |
| | | | Wrought Iron Pipe |

### WHELAND-LUCEY POWER SLUSH PUMP

HP-11500-AB 7½" x 14"

This Pump is recommended for use with type "E" or "ES" Slim Hole Outfits. The smaller outfits for shallower drilling utilize smaller pumps. Write for Pump Bulletin No. 168-A.





# LUCEY EXPORT CORPORATION

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there is water 8 or 9 ft. deep over the bars to make navigation possible. The river port was named from Agua Caliente Creek, a stream of hot mineral water which empties into the Rio Pachitea.

### Geology

The topographic feature denoting the Agua Caliente structure rises to a height of about 600 ft. in extremely rough country. It is on the line of uplift of the Eastern Cordillera, where the most easterly of the Andes foothills begin to appear on the Amazon Plain. The hill, roughly dome-shaped, is entirely encircled by an outcrop of sandstone which dips away from the apex of the structure at angles ranging from 14° to 25°.

This rim rock has been named the Sugar sandstone, more because of its color than because of its texture. Actually, the formation is very resistant and its outcrop forms a ridge 200 to 500 ft. high most of the way around the structure. Inside of this ridge an annular trough has been eroded into the softer underlying sediments.

The structural feature is approximately 15 miles long in a northwest-southeasterly direction and about 9 miles wide along the minor axis. The closure is estimated to be 3,500 ft., but with such an immense structure it is not considered probable that any great proportion of the area will prove productive. The concession also includes a secondary structure of much smaller size which lies 20 miles to the southeast of the Agua Caliente structure.

Surface rocks on the concession are of Cretaceous age. The Sugar sandstone is probably the top of the Upper Cretaceous, and this overlies 1,000 to 2,000 ft. of limestone, marl and shale, known as the Chonta series of lowermost Upper Cretaceous age. All of this section has been eroded away from the top of the surface feature. The Agua Caliente series of alternating sandstones and shales outcrops on the crest of the structure. It is of probable Upper Middle Cretaceous age and includes the oil-bearing horizons.

### Development

Six wells have been completed on the structure, all of which have penetrated good oil sand. Two, however, are in questionable mechanical condition because they were drilled through an ash bed which marks the bottom of the upper oil zone. Water entering these wells from below the ash bed has not been entirely shut off. Below this water sand a deeper oil zone is known to exist. It was penetrated but not tested in 1 Agua

*(Continued on Page 146)*


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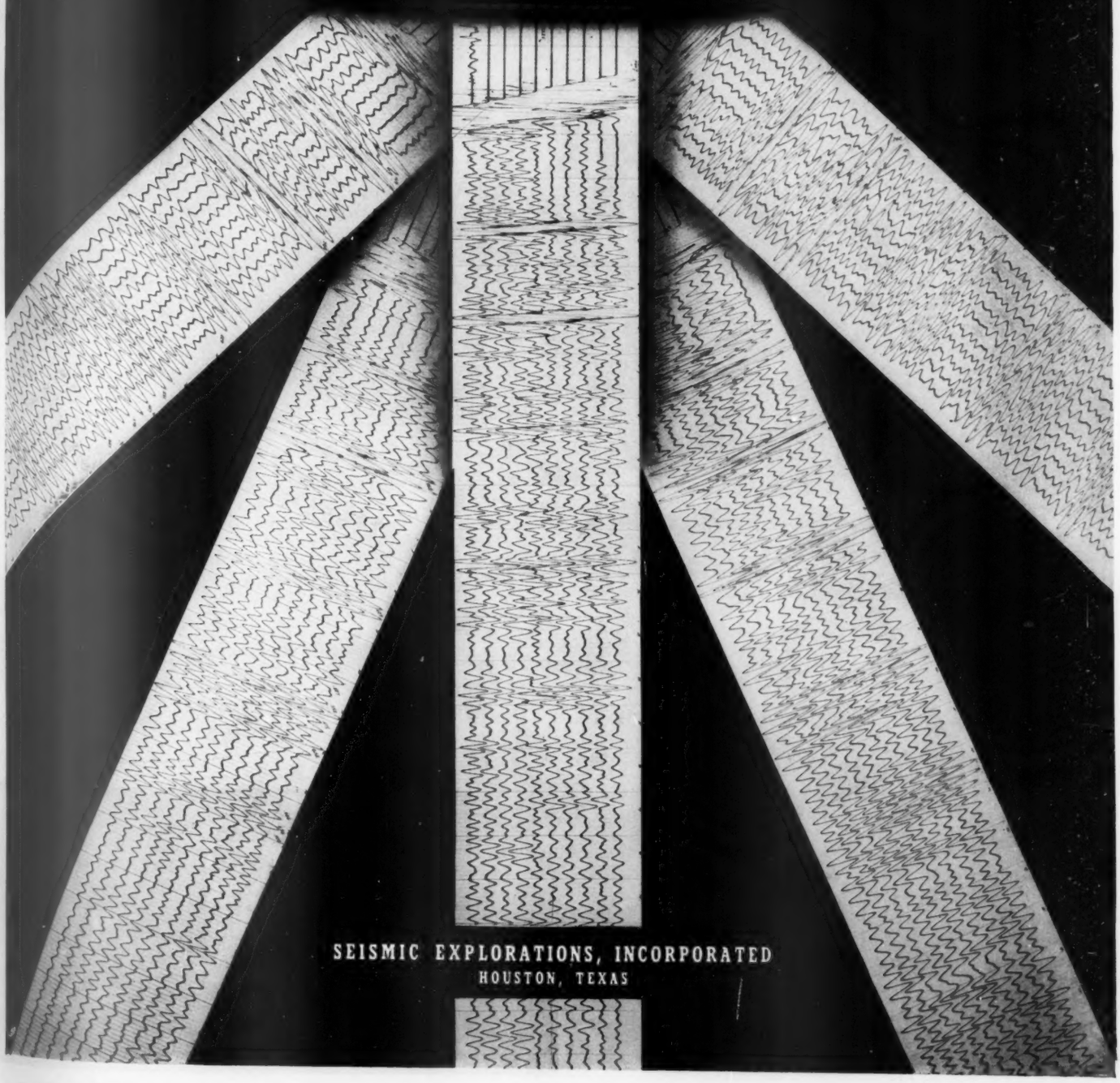
SUBSURFACE SURVEYS



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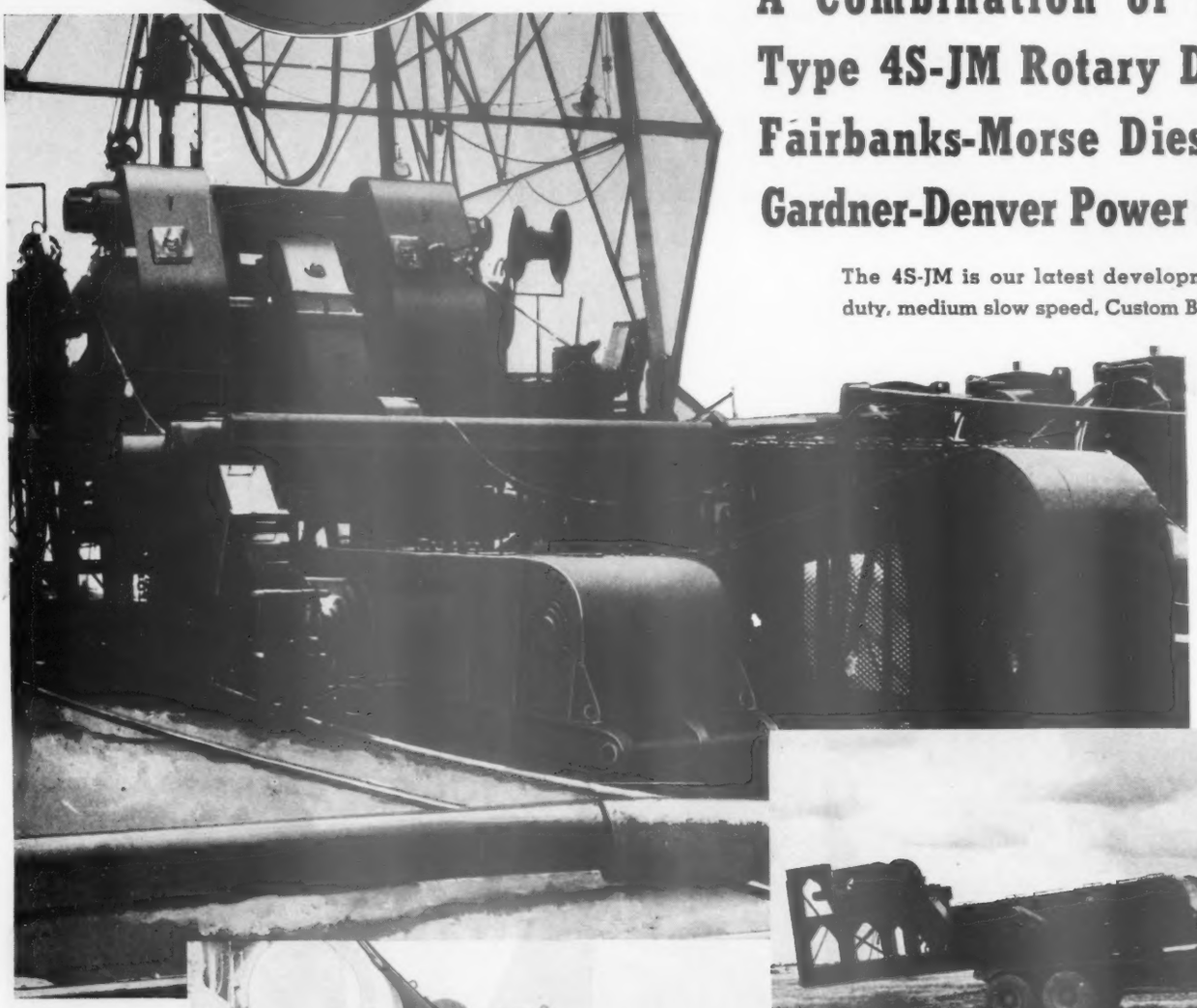
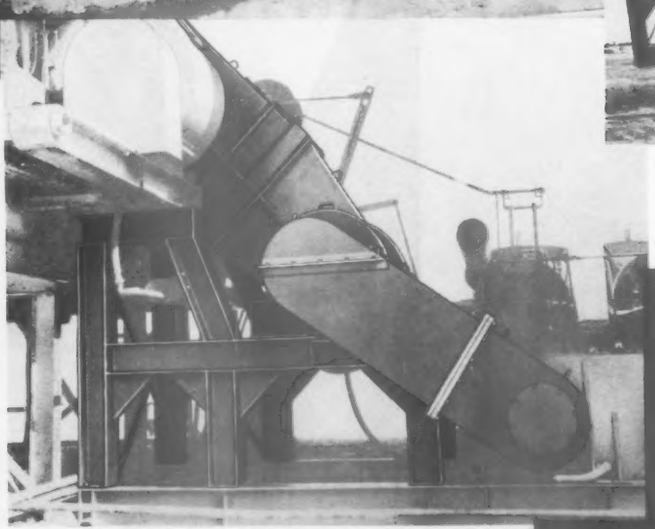


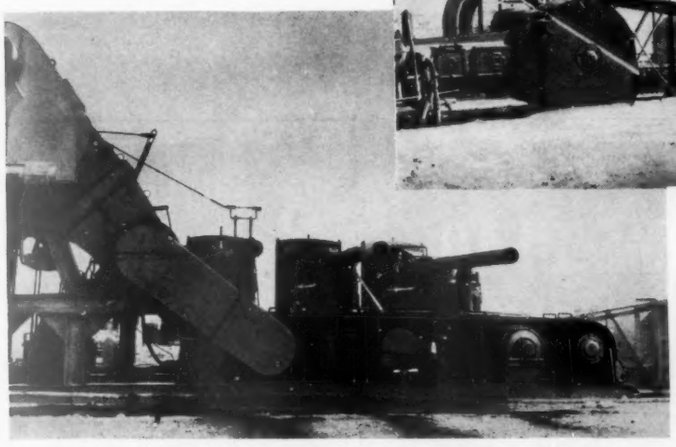
*The 4S-JM Type Drilling Rig a combination of units assem bled in a manner that assure their most efficient operation and best performance.*

*The compounding transmission and substructure are designed to meet the highway (8 foot) regulations.*



*The two step drawworks substructure and drive make it necessary to raise only the drawworks to derrick floor level. With all other heavy machinery on the ground, vibration is minimized and dismantling and assembly is made easy.*

# ROTARY DRILLING RIG



*These three Fairbanks-Morse Model 35-6 cylinder 8¾ x 10½ Diesel Engines compounded develop 975 H.P. peak hoist rating and 600 H.P. continuous duty at the rated speed of 475 R.P.M. maximum.*

*Flexibility of operation is the outstanding characteristic of the 4S-JM Transmission. Engines and pumps can be operated individually or in compound. Hydraulic compounding of pumps is made possible by a unique clutching arrangement in the Transmission.*

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## ONLY THE DRAWWORKS IS ON DERRICK FLOOR

The 4S-JM type drilling rig is a combination of our Emsco EB-8 speed drawworks, Emsco Type K Reverse and Friction Clutch, Emsco 4S-JM—3 engine, 4 shaft Transmission, one each 425 H.P. (8 x 20) and 250 H.P. (7¾ x 16) Gardner-Denver Power Slush Pump and 3 Fairbanks-Morse Model 35-6 Cylinder 8¾ x 10½ Diesel Engines; all assembled in a manner that assures their most efficient operation and best performance.

The two step substructure design employed in this development makes it necessary to raise only the drawworks to the derrick floor level. The rest of the machinery; engines, transmission, and slush pumps with the exception of the reverse clutch are mounted at ground level. The reverse clutch is mounted on a step of the substructure which supports the drawworks. In this manner shorter and more efficient drives can be employed and vibration is reduced to a minimum.

Fairbanks-Morse Model 35, 8¾ x 10½, 6-cylinder Diesel Engines are used as prime movers on the 4S-JM Rig. These are medium slow speed, heavy duty Diesel Engines, well known in the oil fields for their many years of thoroughly dependable and economical service on rotary drilling rigs.

The 4S-JM Transmission is designed to drive two slush pumps. Recommended for this rig is a 425 H.P. 8 x 20 FXL-FB and a 250 H.P. 7¾ x 16 FXQ-FQ Gardner-Denver Power Slush Pump.

These power pumps, the two largest of the Gardner-Denver's complete line, have been proven by many years of severe oil country service to be very exceptional equipment.

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Caliente, and found to contain about 50 ft. of sand interspersed with shale.

The first well was drilled to 3,130 ft. as an exploratory hole. After the desired information had been gained from cores and formation tests, the hole was plugged with cement. Two new derrick corners were then built and the derrick skidded 24 ft. Heavy mud had been used because the presence of the high mountains to the west suggested the possibility of encountering extreme hydrostatic pressures, and it was felt that some of the oil sand may have been mudded off during the deeper drilling.

The objective for No. 1-A was the oil sand that had been found above the ash bed from 1,020-1,174 ft. The hole was drilled in 10 days, including cementing time, and it was completed with 154 ft. of open hole between the 7⅝-in. casing seat (1,020 ft.) and the total depth (1,174 ft.). There is about 90 ft. of oil sand in this producing interval.

The company is somewhat reluctant to disclose figures on well potentials because lack of tank space has prohibited flow tests of sufficient length. The most conclusive test on No. 1-A showed a production of 750 bbl. per day through a ½-in. choke on a 3-day flow. On a short test the production through open 3-in. tubing was estimated at 2,500 bbl. per day. On various short tests the other wells have shown production of 42 to 100 bbl. per hour. Gravity of the oil is 45° A.P.I. and it is accompanied by little gas.

The six completed wells have tended to prove productive an area of about 1 sq. mile. No drilling is now in progress, and no appreciable quantity of oil has been produced because the only outlet is furnished by a home-made topping plant whose capacity is 5 bbl. per day. This has furnished some gasoline, fuel oil, and diesel oil for boats on the river. The diesel oil is of high quality, and some of it has been sold to the Peruvian Government for the equipment engaged in building the new Lima-Amazonian highway across the Andes to the nearby town of Pucallpa on the Ucayali.

### Drilling Method

Power for drilling all wells has been furnished by four 250-lb. 125-hp. boilers. These, together with all other tools and equipment, were shipped to the concession by the Amazon route. A serious mishap occurred when the river steamer, carrying 400 tons of equipment and towing four loaded lighters, was rammed by a submerged log and sank in 20 ft. of water. Due to the remote location, it required nearly 2 months to organize salvage operations, and after recovery of one-third of the cargo, the work had to be abandoned


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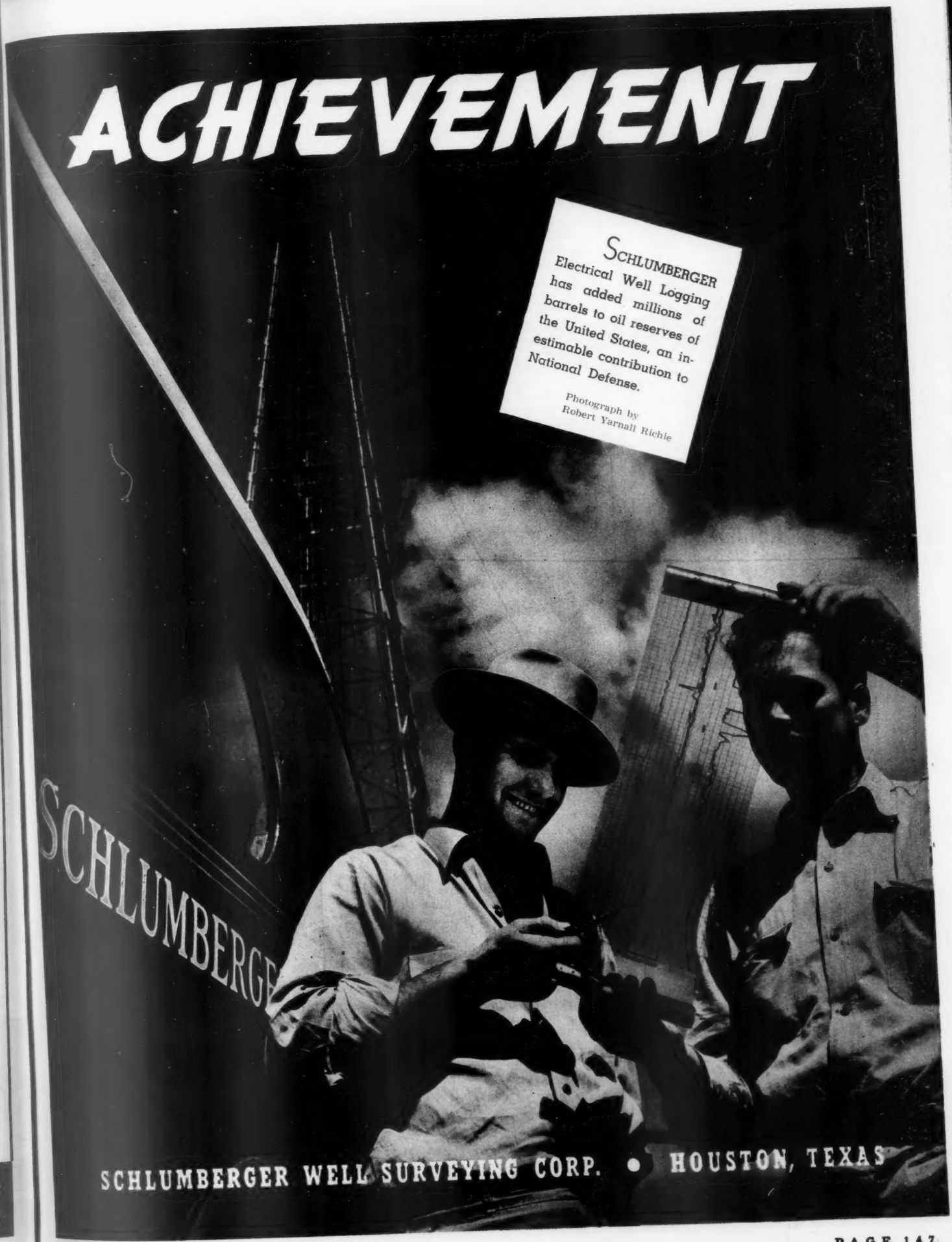
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because of the rapidly rising river. Replacement items had to be ordered from New York.

When the drilling equipment reached the concession, the landing dock and the road to the first location had been prepared by Bart Gillespie, who was at that time development engineer for Ganso Azul. Because of the rough terrain, 6 miles of road had been required to cover a distance of 2 miles in a straight line. Tractors were used for hauling equipment because of the steep grades.

During the drilling of No. 1 and No. 1-A, the boiler had to be fired with wood. As the forest got farther from the boiler plant an overhead cable system was rigged up to bring in the logs. Brick fireboxes were used under the boilers, extending well out in front of the boiler fireboxes. In these a total of 4,000 cords of hardwood having high heating value was burned. In drilling the later wells, sump oil and fuel oil from the home-made topping plant were burned in the boilers. The average drilling time has been a week to 10 days.

### Living Conditions

During the periods of active development there have been as many as 200 men living in the camp, including both natives and North Americans. Yet none of the common tropical diseases have broken out. This strange fact has been due to the almost total absence of previous habitation in the locality as well as to the up-to-date sanitary measures employed by the company. Most of the food is shipped in from the United States, and the procurement and preparation of the remainder is overseen by the company doctor.

A prevailing south wind keeps the temperature on the hilltop lower than would be expected, and the climate is therefore mild. Rainfall averages about 100 in. per year. Most of the work must be done during the dry season, which extends from June to October, during which little or no rain falls.

The virgin nature of the surrounding country, and the isolation, is described by a report recently received at the company's Los Angeles office. A party had made a reconnaissance survey 26 miles into the jungle from the camp. In this short distance they had to cross three rivers, two of which were unexpected. On one of the unknown rivers there were signs of wood cutting by river-boat crews, but there was no indication that civilized men had ever seen the third river.

### Marketing Outlets

It is obvious that as the Amazon country develops, traffic on the river, as well as civilization along its banks, will require a generous supply of oil. The river steamers now spend one-third of their time tied to the banks to load wood for boilers. Cargo space is reduced through the necessity of carrying a large crew of wood cutters on each boat. Most of these steam vessels could be converted quite easily to the use of fuel oil, and the reduced cost of river transportation could do much to encourage industry.

Newer river boats are usually powered by diesel engines, and fortunately the Agua Caliente crude makes excellent natural diesel fuel, a characteristic typical of paraffin-base crudes. Any primitive country presents a potential market for kerosene, and the highway scheduled for completion in the near future can be expected to bring a gasoline market. While the gasoline yield from the crude is high, its octane rating is low, and with the refining equipment being installed at present it will probably be impossible to manufacture gasoline acceptable for aviation use.

The new plant will probably begin operation within 3 months, but difficulty in obtaining tanks may postpone normal operation indefinitely. For full development of the property a larger refinery will some day become necessary, but the operators prefer to build up their business concurrently with the expanding Amazon market.

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Said Clintonville, Wisconsin

2,000,000 Gallons Daily

NEVER in its history had Clintonville, Wisconsin been able to obtain more than 250 gallons of water per minute from any of a number of their wells. The city was growing and the need for a larger supply of water was becoming urgent. Layne Hydrologists made a survey, a contract was closed and the result is a well producing 1400 gallons per minute, or over 2,000,000 gallons per day. Thus again Layne has been outstanding in success where others have failed.

Layne installed their famous gravel wall well—a type of installation that size for size and depth for depth usually doubles and often quadruples the amount of water produced from a given formation. They differ materially from the so called "gravel packed" well and are the most efficient known.

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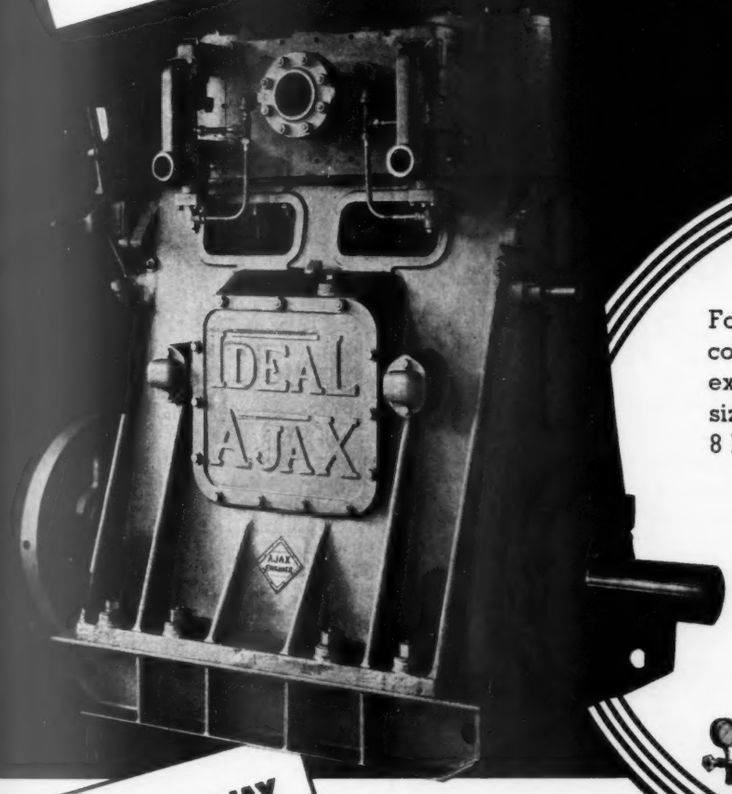
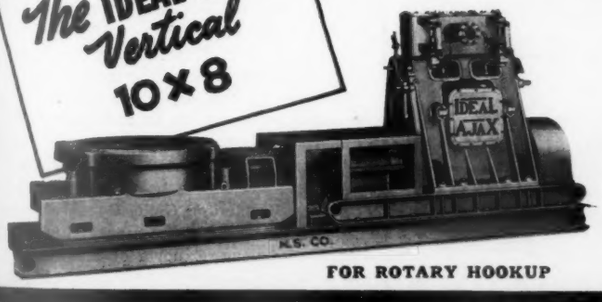
# Steam PLUS IDEAL-AJAX




For instant power, under precise control, with safe high speeds, excellent economy and compact size, the Ideal-Ajax Vertical 10 x 8 leads the field in every field.

The dependability of steam is matched by the performance and durability of Ideal-Ajax in every engine application. • Let your National Supply man give you the facts!

The IDEAL-AJAX Vertical 10×8

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FOR SLUSH PUMP DRIVE

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THE NATIONAL SUPPLY COMPANIES IN EVERY FIELD

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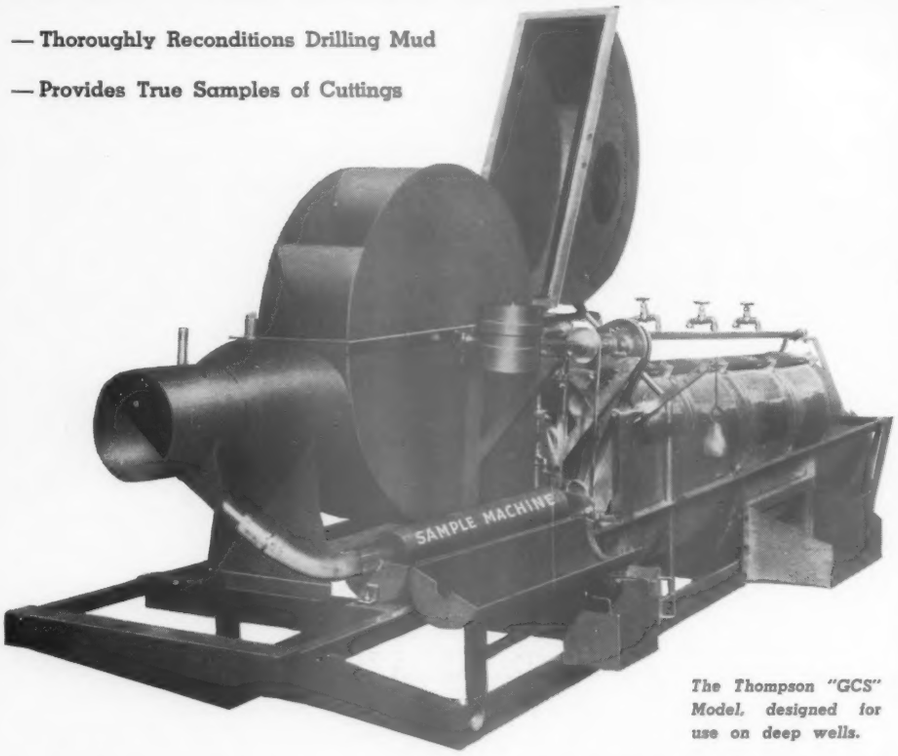


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**Chicago, Ill.**

# Mexico's Oil Production Suffers Further Decline

*(Continued from Page 137)*

immediately preceding expropriation was 65 completions annually.

**MEXICO'S OIL PRODUCTION**

| | Production 1940 | | Production 1941 | |
|---|---|---|---|---|
| | Total | Daily average | Total | Daily average |
| January | 3,078,242 | 99,298 | 3,959,084 | 127,712 |
| February | 3,099,534 | 106,880 | 2,822,229 | 100,794 |
| March | 3,886,331 | 125,366 | 2,895,689 | 93,409 |
| April | 3,317,106 | 110,570 | 3,444,614 | 114,820 |
| May | 3,125,540 | 100,824 | 4,054,073 | 135,136 |
| June | 3,797,728 | 126,591 | 3,812,242 | 127,075 |
| July | 3,958,650 | 127,698 | 3,839,558 | 123,857 |
| August | 3,890,062 | 125,486 | 3,079,780 | 99,347 |
| September | 3,819,506 | 127,317 | 2,965,115 | 98,837 |
| October | 4,182,471 | 134,918 | *3,600,900 | *116,158 |
| November | 3,846,430 | 128,214 | ..... | ..... |
| December | 3,911,963 | 126,192 | ..... | ..... |
| Total | 43,913,563 | 119,982 | †35,473,284 | †116,689 |

*Partly estimated. †Ten months.
Note: Figures include natural gasoline.

The rate of production this year will average around 117,000 bbl. daily, nearly 3,000 fewer than reported for 1940. Furthermore, the 1941 figures used herein include natural-gasoline production.

There were 21 drilling wells reported in Mexico at the end of July. Fifteen were in Vera Cruz and were divided eight to El Plan district and seven to Poza Rica. The remaining six drilling operations were in the Ebano-Chapacao section of San Luis Potosi.

The Poza Rica field, which produces from 60 to 65 per cent of the Mexican crude, has less than 40 completed wells. Daily production of 75,000 to 80,000 bbl. from Poza Rica is reasonably consistent throughout the year, indicating that the daily output per well is more than 2,000 bbl. Accompanying oil production from the Poza Rica field is gas output of approximately 80,000,000 cu. ft. daily, indicating a gas-oil ratio of about 10,000 cu. ft. per barrel of crude.

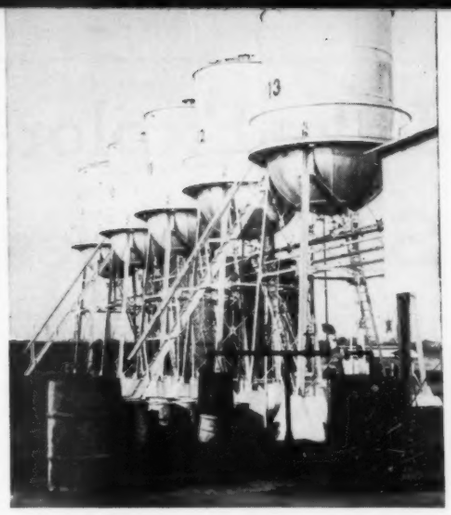
Seven refineries are reported in operation by Petroleos Mexicanos with a total crude capacity of 141,500 bbl. daily. These plants include facilities for cracking 19,700 bbl. daily, but one installation of 2,000 bbl. is now idle. Crude runs to stills during 1941 are estimated at about 89,000 bbl. daily which is slightly higher than the rate of refinery operations in either 1939 or 1940, a little less than in 1938 but substantially below the 1937 mark of more than 100,000 bbl. daily.

Mexican production averaged 116,689 bbl. daily during the first 10 months, including estimates of the private companies' output for October. The monthly output fluctuated between a low of 93,409 bbl. daily in March to a high of 127,075 bbl. daily in October. The 1941 figures include Mexico's production of natural gasoline.

Shipments of Mexican petroleum throughout the year were chiefly to the United States and during the first 7 months averaged 41,650 bbl. daily compared to 56,159 bbl. daily in 1940. Occasional cargoes have been shipped this year to Australia, Brazil, and Chile. Cuba received an average of 125,000 bbl. per month during the forepart of the year. Exports of Mexican oil to the United States averaged 1,128,000 bbl. per month during the first 8 months of 1941. Japan received 761,000 bbl. of Mexican crude in 1940 but that traffic was discontinued at the end of that year.

During the third quarter of 1941, Petroleos Mexicanos imported about 260,000 bbl. of motor fuel made from Mexican crude in the Eastern States Petroleum Co. refinery at Houston, Tex. Mexican refineries are now recovering about 13 per cent gasoline from crude run. Gasoline demand in Mexico continues upward and now totals about 4,400,000 bbl. per year.

# New Still Adds Efficiency To Lago Venezuela Plant



*Elevated tanks supplying the container-filling plant*

INSTALLATION of a modern pipe still in Compania de Petroleo Lago's refinery at La Salina, in the Lake Maracaibo area of western Venezuela, has permitted the company to recover products for local consumption, supply product requirements of operating affiliates and, at the same time, to do the task on a more economical basis.

The La Salina pipe still, which has been in operation since the latter part of 1939, has permitted the company to decommission a batch-steam still in the same refinery and to shut down a plant for the production of fuel oil previously operated at La Arriaga.

Production of gasoline, kerosene and diesel distillate simultaneously above a fuel-oil residue is now possible in the La Salina plant. Design capacity is 5,000 bbl. of crude per day when running light crude for gasoline, kerosene and diesel oil and 10,000 bbl. per day when running heavier crudes for residual fuel.

Personnel required to operate the La Salina refinery totals 79, of which 86 per cent are Venezuelans.

The new crude still also made possible the production of high-grade asphalts, which are in demand to the extent of output in Venezuela's highway program. The asphalt is most frequently applied mixed with heavy naphtha or kerosene cutbacks. Extensive facilities for the mixing and storing of cutback asphalts were available this year for more efficient operation of this phase of the La Salina refinery's operations. Demand for asphalt spread to an extent this year that justified provision of special transportation equipment. The Venezuelan flag tanker "La Salina" was equipped with steam coils to permit transportation of asphalts in bulk to augment barrel shipments made from the refinery and from the bulk stations at La Arriaga and Puerto La Cruz.

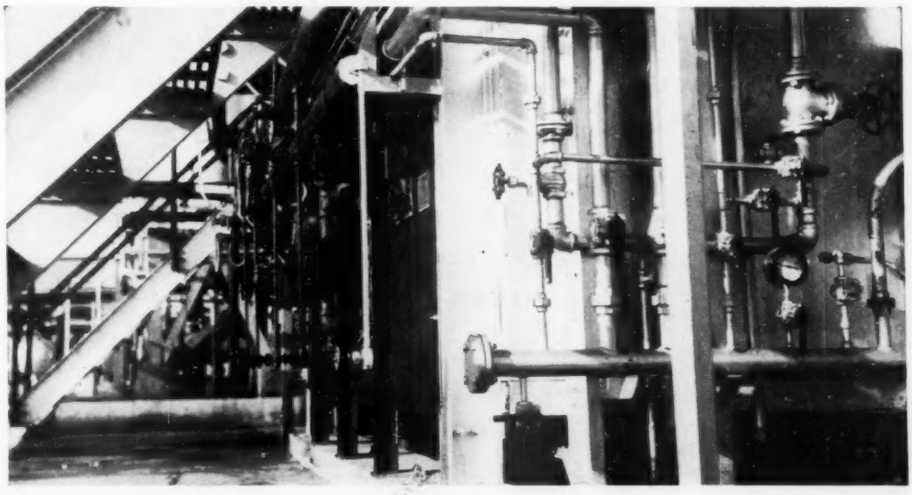
The original refinery at La Salina was constructed to have a capacity of 1,500 bbl. daily and operations were started in March 1925. The first plant was installed and operated by the Lago producing interests for the purpose of topping crude to produce the fuel-oil required for the Lake Maracaibo tanker fleet and to make the gasoline used in trucks, tractors and other automotive equipment engaged in producing operations.

### Diesel Fuels Produced

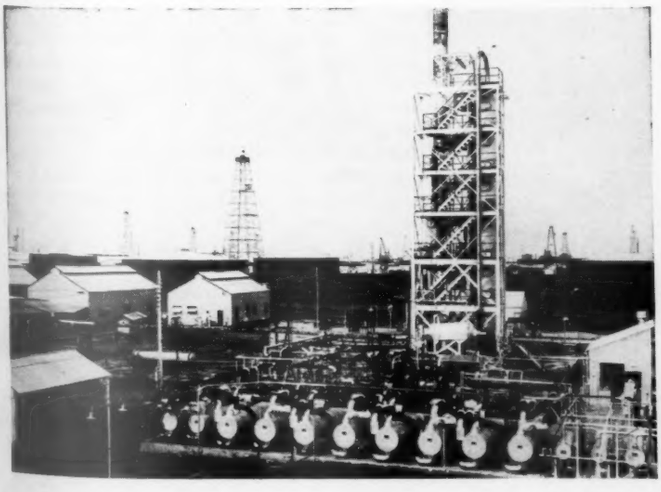
In May 1927 two pipe-still units with capacity of 2,000 bbl. per day were constructed. The equipment for each included an evaporator and fractionating tower with tube-and-tank-type condensers and coolers. In July 1931 a batch-steam still was installed to produce high-quality kerosene distillate for redistilling the intermediate heavy cut made at the pipe-still units. The newer pipe still, along with the installation of a 500-bbl. agitator, permitted abolishment of the batch still. The new equipment also facilitated the production of diesel fuel for moderate and high-speed diesel engines. An agitator was installed to permit treatment of the distillate with caustic soda in order to completely eliminate corrosive substances from this product.

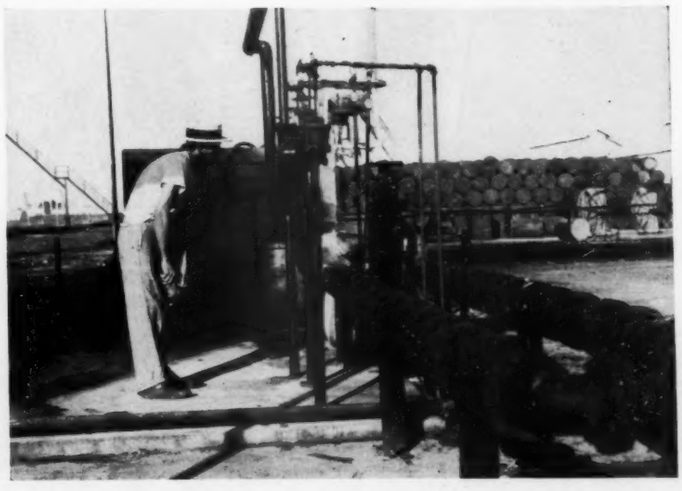
Latest addition to the facilities for finishing products at the La Salina plant was the tetraethyl lead blending equipment. Lead has been blended with all motor gasoline produced at La Salina since the middle of 1940. At first, sufficient lead was blended to raise the quality of motor fuel to 70-72 octane numbers. Subsequently, the octane rating was raised to 72-74.

Facilities have been provided for the manufacture and filling of 18-litre cans for kerosene, gasoline and diesel oil. Complete machinery for cutting, stamping and forming the case from heavy tin plate has been installed, as well as facilities for the storage of filled cans.



*Right: Fire-control end of the furnace. Below: General view of the newest pipe still. Below, right: Controls governing mixture of asphalt*





# Lake Exploration Extends Seven Miles From Shore

EXTENSION of exploitation operations offshore on the Lake of Maracaibo in western Venezuela, principally in the Tia Juana and Lagunillas fields, has made it necessary to develop methods for supporting derricks over progressively deeper water, Lago Petroleum Corp. has completed successfully several stepout wells located at about 7½ miles from the shore. Exploitation under deeper water in the lake has been made possible by an exclusive technique of building derrick foundations developed by engineers of the Lago company.

The present well foundation is of pipe type or caisson type, depending on the depth necessary to drive to obtain required bearing. In the pile type, each of the four corners are supported by two plumb and one batter piles of reinforced concrete. The piles are square and may be 16, 20 or 24 in. square, depending on length. The maximum length of piles used is 133 ft. In the caisson type of derrick foundation, each of the four corners are supported by one hollow reinforced concrete caisson of 4-ft. diameter or more, depending on length. The four caissons are clamped together with steel portals to form a rigid structure. Both types of foundations are capped with a prefabricated steel-derrick base. This base is placed as a unit, and comes on the job with floor decking, engine bracket and pump bracket in place. The rig builders suspend a fabricated landing platform and run up the rig; the draw works are placed as a unit, and the engine together with house and bench as another unit. The drilling barge is then brought up and anchored.

These barges are company-made of all-welded design, and are 110 by 40 by 8 ft. Mud tanks are in the hold which is bulkheaded longitudinally and transversely. The boilers are placed on the stern of the first deck and directly in front are the pumps and manifolds. Between the first and second decks are the mud ditches, steam and water lines, fuel tank, mud screen, light plant and other auxiliaries. The second deck is used as the pipe racks for drill pipe, casing, tubing and miscellaneous fittings. When fully loaded the first deck has approximately 2½ ft. freeboard and the second about 8 ft. A ramp connects the upper deck and the derrick floor and may be from 12 to 17 ft. above the lake level. The drilling barge is held in position by 5,000-lb. anchors, fore and aft. The barge can be drawn away from the derrick by power-driven winches.

### Marine Operations Expensive

Required for servicing the producing operations on water are barges of special design such as cement barges having storage facilities, motor-driven conveyors, mixing hoppers, pumps and manifolds; self-propelled derrick barges for material handling; fuel barges; construction barges; compressor barges; pipe-line barges, and pile drivers as well as tugs, and various types of passenger and service boats. Improvements in design of facilities are expected to continue, but the specialized equipment and the large-scale-plan installations required make this type of operation efficient and economically possible only when high producing rates can be maintained over a substantial period of time.

Until 1931 the Lago's development of its holdings was restricted to a narrow strip of water area in Lake Maracaibo, paralleling the shore line. This was not only due to competitive reasons but up to this time an extension lakeward had not been made.

The general type of lake construction at this time was a wood pile foundation, capped off and braced. This carried a wooden deck, and in the case of wells, a wooden substruction. A field layout shows a boiler station with board walks radiating to the several wells it might service. Each well is flanked by other platforms — for pumps, mud tanks, pipe racks, manifolds, flow stations, separator or transformer tanks. Piers for handling freight and shipping crude and products reach from shore to navigable water.

The first cost and maintenance of wooden marine structures proved excessive. The corrosive action of the lake water on steel was such that the most economical alternative was concrete. In the latter part of 1931 the company built its own pile-casting yard.

During the following years new structures were designed and built as well as a complete new and special design of mobile equipment. Sixty feet of water has been found to be about the practical limit of precast concrete pile construction. Foundations in water with greater depth are being constructed on precast reinforced concrete caissons.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The Twin Disc Torque Converter's characteristic "slip" is a distinct advantage to the driller because it provides a safety factor. With the table rotating, it prevents the drill pipe from snapping off with a sudden shock load. Varying loads at the drill pipe are met immediately by the converter's automatic torque-speed adjustment . . . another reason why drillers say that a Twin Disc Torque Converter gives an internal combustion engine the desirable characteristics of steam performance. TWIN DISC CLUTCH COMPANY, 1328 Racine Street, Racine, Wis.

ILLUSTRATED: *Hydraulic Torque Converter.*

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The complete drilling rig embodies a trailer on which is mounted the slush pumps and auxiliary unit. On the drilling truck or trailer and pump trailer, are carried the two lower sections of the 122 foot mast. The upper section is carried by an auxiliary truck.

### MOTOHOIST—A Mobile Well-Servicing Unit, Complete with Mast which Requires No Guys

The U-24 MOTOHOIST was designed and built to meet the ever increasing demand for highly mobile, powerful and flexible well-servicing equipment. As illustrated, it is a self-contained truck-mounted unit, having a separate prime mover which drives through a Twin-Disc torque convertor to U-24 Well Servicing Hoist which is equipped with two Air-O-Matic clutches, one on either end of the drum shaft, which give high and low ratio to the drum, thus obtaining the maximum from the torque convertor. The Automatic Mast is raised and lowered by the "Flexible Speed Control." Only one control lever is required for operating the hoist and raising or lowering the mast. This one lever engages the clutches and controls the throttle for all operations.

While the MOTOHOIST illustrated is equipped with independent prime mover and torque convertor, it can be furnished with power take-off, employing the truck motor to perform all functions described. When truck motor is used, the truck transmission may be used instead of torque convertor, or, if torque convertor is desired, it can be used in conjunction with power take-off.

**UNIT RIG & EQUIPMENT CO.**
TULSA OKLAHOMA U.S.A.

# *Drilling Shows Likely Prospects in Brazil*

By EDSON DE CARVALHO
President, Companhia Petroleo Nacional Alagoas, Brazil

RIO DE JANEIRO, Brazil. — A survey of the achievements of the Conselho Nacional do Petroleo in the last 2 years reveals beyond any doubt the discovery of much territory with good possibilities and favorable structural features. No effort has been spared by the government oil agency to develop a petroleum industry on a wholesome and economical basis. In this respect, credit should be given to Gen. Julio C. Horta Barbosa, president of the conselho, and also to Prof. D. Fleury da Rocha, vice president, for planning and creating a farsighted program, which is a model for a country that only recently has created its petroleum department.

However, it is the writer's belief that considerably more could have been accomplished if our petroleum legislation had been modified, in order to facilitate the pioneer's work towards creating new sources of wealth and furthering the search for oil in our vast territory. Sometimes it takes many years to locate a field that will prove to be a good producer. Moreover, as we all know, petroleum is very difficult to produce, and it is no less difficult to reduce it to its best values for distribution.

The Brazilian laws, which require that exploration and refining must be carried out by native Brazilians alone, are actually prohibiting further development, at a time when individual enterprise should be at a premium. Unless Pres. Getulio Vargas finds it necessary to modify the mining code, the government oil agency alone must shoulder the task of opening new fields in a country almost as large in territory as the United States.

The writer in previous articles written for The Oil and Gas Journal had occasion to refer exclusively to the oil province extending along the Atlantic coastal belt, embracing several basins from Baia up to the Amazon, where strips of Mesozoic and Tertiary sediments are folded into structures. Examination of the Brazilian oil possibilities from another angle is now in order. First for consideration is the oil provinces covering wide areas in the different parts of Brazil's immense territory and a conclusion may be drawn as to what it will mean in time and resources, to conduct research alone on the fundamentals dealing with the origin, occurrence and environment of oil deposits.

### Basement Rock Covers 42.7 Per Cent

Brazil covers 8,525,117 sq. km. of the most promising territory on the face of the earth. It can be best understood by intimate examination. However, a glance at its geological formations may help to determine objective of this article. our petroleum possibilities.

The basement rocks in which are also included the metamorphic formations of pre-Devonian age, comprise 42.7 per cent of the country's total area. The basement complex runs in a belt along the extreme north, extending beyond Brazil's boundary with the Guianas, southern Venezuela and Colombia, measuring approximately 2,000 km. in length by 200 to 700 km. in width. Rocks of this class are also to be found in the plateau of Mato Grosso, bordering on the State of the Amazon; in the interior of Ceara, Rio Grande do Norte, Pernambuco, Alagoas, Sergipe and Baia; in the zone of Mantiqueira and Serra do Mar. Beside this continuous area, there are also others of indeterminate size and shape in the states of Rio, Sao Paulo, Parana, Santa Catarina and Rio Grande do Sul. The basement complex is not oil-bearing.

*Devonian.*—Devonian formations in Brazil underlie a very large area and appear to be one of the most promising zones in the search for oil. The Devonian strata cover a great part of the State of Amazonas, overlying the Silurian. In some places the fillings of fissures outcropping on land surfaces are to be seen. Such dikes may be the exposed roots of ancient flows and it may also be a part of the great lava flood, which spreads over large areas in the Parana basin of southern Brazil, extending to Uruguay and Paraguay in a succession of sheets, in some places totaling 2,500 ft. in thickness. Devonian rocks are not known in the lower land around Manaos, the capital of Amazonas, but we find them south of the Amazon River and also at Tapajos, south of Itaituba. These systems of rocks are also to be found in the State of Mato Grosso, forming a plateau east of Cuiaba. Here they strike southwest.

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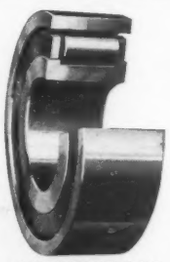
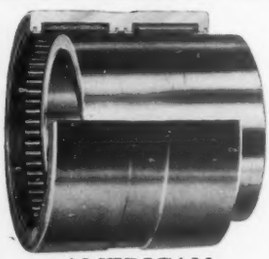


AMERICAN RADIAL BEARING



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Each one of these carefully engineered, field-proven, time-tested bearings, when properly applied, will give smooth, trouble-free performance throughout the life of the equipment. When you *buy* new drilling equipment play safe and specify "Americans"; when you *build* drilling equipment consult American Roller Bearing Company engineers for practical advice and technical facts!

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AMERICAN Heavy-Duty ROLLER BEARINGS

Farther down, they appear in Sao Paulo, Parana, Santa Catarina and Rio Grande do Sul.

*Carboniferous.*—The Carboniferous formations cover an area considerably smaller than that of the Devonian. It is found in Amazonas, Para, Sergipe, Baia, Sao Paulo, Parana, Santa Catarina and Rio Grande do Sul.

*Mesozoic.*—Triassic, Jurassic and Cretaceous formations are found in almost every state of Brazil. Triassic rocks occur in Amazonas, Mato Grosso, Minas Geraes, Sao Paulo and the Parana basin, where are found the most important formations of all. Here in the eastern basin, the Triassic, which exists in immense beds, occupies a large area, extending from the northern margin of the basin at Canastra Mountain in Minas and through the states of Sao Paulo and Parana. At the south of the Iguassu River, the eastern margin of the basin rounds up the Uruguay River, pointing to Serra do Mar south of Santa Catarina and north of Rio Grande do Sul.

Little information is available concerning the Jurassic. Some geologists are of the opinion that the lava flood deposits are of this age.

The Cretaceous is found along the coastal belt running along the Atlantic from the State of Baia all the way to the Amazon. It is also found in the Amazon basin, running to the borders of the Andes. A great area also outcrops in the central plateau, forming a great part of the basin of the San Francisco River, Parnaiba and Tocantins. This system is also found in Sao Paulo and Parana.

*Tertiary.*—This formation is the most common and best known along the coastal belt. According to Prof. Avelino Ignacio de Oliveira, one of the best known Brazilian authorities of the petroleum geology of Brazil, the possibilities of this country for oil may be summarized as follows:

| | Area (sq. km.) |
|---|---|
| Area with best possibilities for oil | 492,650 |
| Area considered of interest | 2,335,850 |
| Area with secondary interest | 934,250 |
| Total possible acreage | 3,762,750 |
| Area considered of no interest | 1,132,251 |
| Area considered negative | 3,630,116 |

Drilling practices and equipment used by the government oil agency are well abreast of the times. In Baia and Alagoas large rotary rigs imported from the United States are in use. Preparations are always made for drilling tests to 8,000 and 10,000 ft. None has yet reached 10,000 ft.

In Alagoas one of the tests went through about 300 ft. of salt rock. The core appears to be nearly pure. It was reached just below 3,000 ft. A new test, about 5 km. to the east, failed to reveal the salt rock, while more than 200 km. south, in Sergipe, approximately at the same depth, a similar salt bed was found.


NO PROTECTOR will PROTECT your THREADS like WEDGE THREAD PROTECTORS which give FOUR POINT PROTECTION

HERE THEY ARE

1. CLEARS CREST OF THREAD
2. LOCKS INSIDE OF PIPE
3. CLEARS FIRST FEW THREADS
4. HAVE SMOOTH ROLLED THREADS

Patent No. 2,156,169

The reason WEDGE Thread Protectors give the most protection is because they have ESSENTIAL protective features—that are exclusive and patented. Study the illustration and the four points. To protect your pipe in transit against damaged threads, specify WEDGE Thread Protectors on each pipe order, for this will assure you 4-POINT PROTECTION. Damaged threads often cause serious and costly delays.

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By using WEDGE Chill Rings with the patented SPLIT Feature, you can weld your lines FASTER. They are FLEXIBLE and will adjust themselves TIGHTLY to the irregular diameter of unfinished inside surfaces of pipe. Skilled help will be able to weld FASTER, and even less skillful help can do BETTER.

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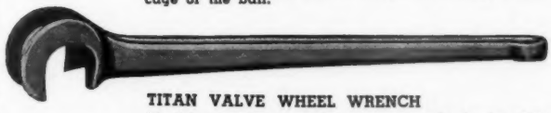
"Most Complete Line of Tongs in the World"

PETOL TOOLS — TITAN TOOLS

TITAN VALVE CAGE WRENCH

A strong, high-grade alloy steel wrench for handling the toughest valve cage jobs. Each wrench will handle many sizes of cages without danger of damage to the cage or the ball.



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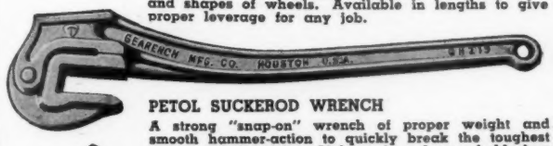
Used to provide extra leverage on hand wheels while closing and opening valves. Wrench fits many sizes and shapes of wheels. Available in lengths to give proper leverage for any job.

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A strong "snap-on" wrench of proper weight and smooth hammer-action to quickly break the toughest rod or coupling joint. Light spring plunger holds jaw in closed position to make it easier to put on or take off.

ROTARY AND CASING TONGS

Light, compact tongs for handling both tool joints and casing used on portable rigs. Only a few seconds required for changing from one size to another. Tongs fitted with quick-change replaceable teeth inserts.

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Most practical, most flexible, most efficient and most economical swab on the market. Falls faster and smoother than any other swab. No metal parts to strip off.

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# Cracking Oil From Arabia Gives High Gasoline Yield

DAVIS READ, JR. and GUSTAV EGLOFF
Universal Oil Products Co.

OIL concessions in Arabia were granted in July 1933 and geological explorations began at once. The principal producing structure in Saudi Arabia is Dammam lying 20 miles inland from the coast opposite Bahrein Island. This area is capable of producing over 29,000 bbl. per day, and was the first area opened. The first well yielded oil of 51° A.P.I. gravity; the second well gave a 50° gravity oil at a depth of 2,175 ft. With the exception of these two wells the oil from the Dammam area ranges from 35° to 40° A.P.I. gravity crude from depths up to 4,500 ft. Other horizons seem favorable in this field but due to inadequate outlet and refining facilities no development has taken place as yet.

A second test well opened up the field of Abu Hadrya which is about 100 miles northwest of Dammam. Construction of a pipe line to the coast is holding up its actual production. Maagola, also on the Saudi Arabian mainland, gave promising indications, but there, too, the test was suspended doubtlessly awaiting transportation developments. The fourth producing area in Saudi Arabia is the sheikdom of Kuwait. The discovery well there had a potential production of approximately 4,400 bbl. per day from a depth of about 3,500 ft. Many of the wells drilled in this area are capable of producing better than 5,000 bbl. daily for each. The oil is about 34° A.P.I. gravity and the production zone from 3,500 to 4,500 ft.; this production is also shut in until the pipe lines and refineries now in construction are completed and placed in commercial operation.

### Potentialities Exceed Performance

As an oil-producing area, Saudi Arabia is reaching the production levels of Bahrein Island. During 1940 the Saudi Arabian production amounted to 5,365,000 bbl. while that of Bahrein was 7,047,000 bbl. The Saudi Arabian production will probably be much higher when pipe line and refinery facilities are adequate.

**TABLE 1—LABORATORY INSPECTION OF ARABIAN TOPPED AND REDUCED CRUDES**

| Sample— | Topped crude | | Reduced crude | |
|---|---|---|---|---|
| Gravity, °A.P.I. | 28.1 | | 17.0 | |
| Furol visc. at 122° F., sec. | ... | | 97 | |
| Univ. visc. at 100° F., sec. | 71 | | ... | |
| Sulfur, per cent | 1.82 | | 3.04 | |
| B.s. and w., per cent | 0.2 | | 0.3 | |
| Cold test, °F. | 30 | | 55 | |
| Pensky-Martens flash, °F. | 180 | | 410 | |
| Salt as sodium chloride, lb./1,000 bbl. | Trace | | Trace | |
| Characterization factor | 11.76 | | 11.52 | |
| **100 cc. distillation:** | **Atmos.** | **Vacuum** | **Atmos.** | **Vacuum** |
| I.B.P., °F. | 372 | 372 | 616 | 630 |
| 5 per cent | 412 | 412 | 674 | 714 |
| 10 | 435 | 435 | 682 | 756 |
| 20 | 481 | 481 | 694 | 796 |
| 30 | 541 | 541 | 703 | 830 |
| 40 | 592 | 605 | 710 | 870 |
| 50 | 650 | 671 | 717 | 904 |
| 60 | 693 | 744 | 724 | 948 |
| 70 | 712 | 817 | 733 | ... |
| 80 | 730 | 896 | 739 | ... |
| 90 | 744 | ... | ... | ... |
| End point, °F. | 746 | 950 | 739 | 975 |
| Per cent over | 96.0 | 89.0 | 91.5 | 71.0 |
| Per cent by weight | 4.2 | ... | 8.4 | ... |
| Per cent bottoms by weight | ... | 11.6 | ... | 30.0 |

Arabian crude oil was topped and reduced to 28° and 17° A.P.I. gravity. The cracking stocks were subjected to two-coil cracking under a variety of conditions to produce gasoline, coke and gas or gasoline, fuel oil and gas.

Samples of both a topped and a reduced crude produced in commercial distillation of Arabian oil were inspected in the laboratory and evaluated in cracking tests conducted in a Dubbs pilot plant. The topped crude represents the bottoms remaining after the removal of a 360° F. end-point straightrun gasoline, while the reduced crude represents the 17° A.P.I. gravity residue obtained by removing the intermediate straightrun fractions. Detailed properties of the two charging stocks are given in Table 1.

### Method of Analysis

The stocks were each processed in the pilot plant using a two-coil recycle cracking operation to produce a 400° F. end-point 9.5-10-lb. gasoline with a coke residue and alternately a 6°-7° A.P.I. gravity liquid residuum. The operating conditions, yields, and properties of the products are given in Table 2. The coking test on the topped crude was 35 hours in duration during which 40.60 gal. of charging stock was fed to the cracking unit and 59.7 lb. of coke was accumulated in the coke chamber. The test on the heavier reduced crude was 16 hours in duration and 27.24 gal. of oil were processed with a production of 57.2 lb. of coke in the single chamber. The residuum tests were of shorter duration; however, check results were obtained in successive test periods on each stock.

Yields of 70.3 per cent of 67-octane number gasoline and 62 lb. of coke per barrel of charge were obtained when coking the topped crude. When producing 36.4 per cent of 6.3° A.P.I. gravity liquid residue in a second test on the topped crude a yield of 56.1 per cent of 65.5-octane number was obtained. Similarly the reduced crude produced 33.1 per cent of 67.5-octane number gasoline and 61.8 per cent of 6.8° A.P.I. gravity liquid residue and when running to coke the yield was 61.4 per cent of 67.5-octane number gasoline. A comparison of the octane rating of the gasoline produced in coking the topped crude with that for the residuum operation shows a decrease of 1.5 points for the latter. This may be due to the fact that since the topped crude was fed directly to the fractionating column the total gasoline produced consisted of the straightrun naphtha which was present in the charge together with cracked gasoline. In the liquid-residuum operation the proportion of the lower octane straightrun naphtha in the total gasoline is higher and consequently a lower octane number product would be anticipated.

Table 3 shows the composition of the cracking plant gas and gasoline. Representative samples of the gas streams collected by displacing saturated salt solution from 8-l bottles during each test

*(Continued on Page 159)*

**TABLE 2—CRACKING RESULTS—DUBBS PILOT PLANT**

| Charging stock: | Topped crude | | Reduced crude | |
|---|---|---|---|---|
| Type of residue: | Coke | Liquid residuum | Coke | Liquid residuum |
| **Operating conditions:** | | | | |
| Pressures, lb./sq. in. gage: | | | | |
| Heavy-oil coil | 250 | 250 | 250 | 250 |
| Light-oil coil | 350 | 350 | 350 | 350 |
| Reaction chamber | 250 | 250 | 250 | 250 |
| Coke chamber | 128 | | 126 | ... |
| Flash chamber | 50 | 50 | 40 | 35 |
| Stabilizer | 178 | 178 | 176 | 177 |
| Temperatures, °F.: | | | | |
| Heavy-oil transfer | 915 | 915 | 910 | 910 |
| Light-oil transfer | 960 | 960 | 960 | 960 |
| Reaction chamber | 879 | 879 | 875 | 877 |
| Coke chamber top | 825 | | 822 | |
| Flash chamber top | 773 | 761 | 785 | 803 |
| Fractionator: | | | | |
| Bottoms | 694 | 701 | 702 | 675 |
| Vapor leaving | 345 | 355 | 315 | 303 |
| Stabilizer: | | | | |
| Top | 91 | 83 | 78 | 83 |
| Bottom | 359 | 363 | 360 | 363 |
| Rates, gal. per hour: | | | | |
| Raw oil | 1.16 | 1.87 | 1.71 | 3.15 |
| Heavy combined feed | 4.0 | 4.0 | 4.0 | 4.0 |
| Light combined feed | 3.0 | 3.0 | 3.0 | 3.0 |
| Combined feed ratio | 6.0 | 3.7 | 4.1 | 2.2 |
| **Yields, volume per cent of charge:** | | | | |
| Gasoline | 70.3 | 56.1 | 61.4 | 33.1 |
| Residuum | | 36.4 | | 61.8 |
| Recovery | 70.3 | 92.5 | 61.4 | 94.9 |
| Liquid volume loss | 29.7 | 7.5 | 38.6 | 5.1 |
| **Gas, cu. ft. per bbl. of charge:** | | | | |
| Receiver and stabilizer gas | 584 | 382 | 488 | 307 |
| Coke-chamber gas | 252 | | 500 | |
| Total gas | 836 | 382 | 988 | 307 |
| **Coke, lb. per bbl. of charge** | 62 | ... | 104 | ... |
| **Properties of products:** | | | | |
| Untreated stabilized gasoline: | | | | |
| Gravity, °A.P.I. | 60.1 | 59.7 | 61.3 | 60.0 |
| Total sulfur, per cent | 0.12 | 0.12 | 0.15 | 0.25 |
| Mercaptan sulfur, per cent | 0.04 | 0.04 | 0.05 | 0.06 |
| R.v.p., lb. | 9.5 | 10.0 | 9.6 | 10.0 |
| Oct. No., C.F.R. motor | 67 | 65.5 | 67.5 | 67.5 |
| 100 cc. A.S.T.M. distillation: | | | | |
| I.B.P., °F. | 97 | 92 | 100 | 94 |
| 5 per cent | 114 | 116 | 123 | 119 |
| 10 | 128 | 131 | 137 | 137 |
| 20 | 160 | 169 | 167 | 165 |
| 30 | 194 | 207 | 196 | 197 |
| 40 | 226 | 242 | 223 | 228 |
| 50 | 256 | 277 | 248 | 258 |
| 60 | 284 | 304 | 273 | 286 |
| 70 | 308 | 325 | 295 | 312 |
| 80 | 332 | 349 | 323 | 338 |
| 90 | 360 | 373 | 357 | 374 |
| End point, °F. | 396 | 405 | 395 | 410 |
| Per cent over | 96.5 | 96.0 | 95.5 | 96.0 |
| Per cent bottoms | 1.0 | 1.0 | 1.0 | 1.0 |
| Per cent loss | 2.5 | 3.0 | 3.5 | 3.0 |
| **Liquid residuums:** | | | | |
| Gravity, °A.P.I. | ... | 6.3 | ... | 6.8 |
| Furol vis. at 122° F., sec. | ... | 76 | ... | 335 |
| Sulfur, per cent | ... | 4.07 | ... | 4.32 |
| Cold test, °F. | ... | 25 | ... | 45 |
| Pensky-Martens flash, °F. | ... | 210 | ... | 265 |
| 100 cc. distillation: | | | | |
| I.B.P., °F. | ... | 470 | ... | 523 |
| Per cent at 572° F. | ... | 8.0 | ... | 1.0 |
| Per cent over | ... | 82.0 | ... | 78.0 |
| Per cent coke by weight | ... | 17.4 | ... | 21.5 |
| **Coke:** | | | | |
| Proximate analysis, per cent by weight: | | | | |
| Moisture | 0.09 | ... | 0.18 | ... |
| Ash | 0.18 | ... | 0.64 | ... |
| Volatile matter | 9.50 | ... | 6.03 | ... |
| Fixed carbon (by difference) | 90.23 | ... | 93.15 | ... |
| Total | 100.00 | ... | 100.00 | ... |

# BAKER Practical and Dependable Oil Tools

## BAKER MODEL "K" CEMENT RETAINER

**(Product No. 400)**

Baker Model "K" Cement Retainer (Product No. 400) with Model "L" Circulation Joint (Product No. 430-L)

**USE:**

Provides a safe, sure means of placing cement through tubing or drill pipe at the place where it will be most effective, at any predetermined point behind casing or liner; or around the shoe. It is adaptable to any pressures within the safety factor of the casing.

### *APPLICATIONS*

Recementing
Cementing Behind Sections of Pipe
Reducing Gas/Oil Ratios
Plugging Off Bottom Fluids
Plugging Back to Upper Zones
Testing Upper Cased Formations
Squeeze Jobs
Cementing Off to Perforate for Production
Cementing Bad Pipe
Cementing Two Strings Together
Cementing Low-Pressure Zones
Use of Cement Retainer as Casing Bridge Plug

**IMPORTANT FEATURES:**

### *EASY TO RUN*

Any experienced crew can safely run and successfully set the Baker Cement Retainer.

### *POSITIVE PACK-OFF*

**TWO NEW CONSTRUCTION FEATURES** assure positive sealing against casing and eliminate any possibility of fluid by-pass. Tool is hydraulically tripped and when set, the oil resistant packing forms a positive seal against the casing. **ONE NEW FEATURE** is the addition of a lead ring on either end of the packing member, which, when the latter is expanded, hermetically seals the ends of the packing, preventing any possibility of fluid by-pass. **THE OTHER NEW FEATURE** is the use of flow stop discs, small metal discs located in the body of the Retainer underneath the packing. These discs act as valved ports and prevent any flow of the packing into the Retainer Body when the packing is compressed.

### *RETAINER WILL STAY WHERE SET*

Two sets of annular segmented wickered slips prevent movement of the tool, once it is set, either up or down the hole.

### *EFFICIENT BACK PRESSURE VALVE*

Ball Back-Pressure Valve, which becomes operative immediately after Retainer is set, prevents return or equalizing of the slurry.

### *FLUID CAN BE BLED OFF*

At any time during circulating or cementing operations, fluid can be by-passed out through Circulation Joint, which is run just above the Cement Retainer.

### *HIGH PRESSURES POSSIBLE*

The Baker Model "K" Cement Retainer will safely withstand any pressures that can be imposed within the safety factors of the casing in which it is set.

## BAKER CEMENT WASH-DOWN WHIRLER FLOAT SHOE

**(Product No. 120)**

*Product No. 120 Baker Cement Wash-Down Whirler Float Shoe*

**USE:**

For safe landing and efficient cementing of casing strings of any length.

**IMPORTANT FEATURES:**

**PLASTIC BALL-TYPE BACK PRESSURE VALVE** assures positive seal against either low or high back pressures.

**BAFFLED WHIRLER PORTS** provide important whirling action for washing away bridges while running in; during cementing, this whirling action assures best possible chance for uniform distribution of slurry at the shoe and the shoe joint, with minimum hazard of channeling.

**EASY DRILLABILITY** resulting from use of Baker-Formula concrete for the plug and guide portion of the Shoe, and plastic for the back-pressure valve assembly.

## BAKER CEMENT WASH-DOWN WHIRLER GUIDE SHOE

**(Product No. 121)**

*Product No. 121 Baker Cement Wash-Down Whirler Guide Shoe*

**USE:**

For guiding and cementing casing strings of any length. Unit is usually used in combination with one or more Baker Cement Float Collars.

**IMPORTANT FEATURES:**

Plug of Baker-Formula Concrete is securely anchored in steel casing shoe, affording both strength and drillability. Baffled ports provide efficient whirling action.

## BAKER CEMENT FLOAT COLLAR

**(Product No. 101)**

*Product No. 101 Baker Cement Float Collar*

**USE:**

As a floating unit in casing string. Collar is generally used in combination with a Baker Cement Wash-Down Whirler Guide Shoe, a Baker Cement Wash-Down Whirler Shoe or other type of Baker Shoe. This Collar also serves as a stop for the cementing plug, retaining cement tailings inside the casing and insuring less chance of contamination of cement outside the shoe.

**IMPORTANT FEATURES:**

Ample strength; efficient ball type back-pressure valve; and easy drillability.

*For more complete details concerning the above equipment, see pages 221, 222 and 234 of the 1941 Baker or Composite Catalog.*

# BAKER Practical and Dependable Oil Tools

## BAKER ROTARY WALL SCRAPER
**(Product No. 500)**

**USE:**

**For enlarging the walls of an open hole to a diameter considerably greater than that of the casing through which it is run. Enlargement may be performed at any desired point in the open hole. The Wall Scraper can also be converted into a Baker Wall Sampler by substituting a special set of Sampler Blades for the regular Wall Scraper Blades.**

### *APPLICATIONS:*

Bringing-in and Cleaning-Up Wells • Setting Liners • Gravel Packing • Bottlenecking Before Cementing • Removing Sections of Drillable Pipe • Enlarging at C.P. • Setting Cement Plugs • Water Shut-Off Tests

***Product No. 500***
***Baker Rotary Wall Scraper***

### IMPORTANT FEATURES:

### *SIMPLICITY OF USE AND OPERATION*

**Tool is practically fool-proof. It is constructed of a minimum number of essential parts, and any experienced driller can operate it without difficulty and with assurance of satisfactory results.**

### *GREAT STRENGTH AND SAFETY*

**Body of Wall Scraper is machined out of a solid piece of alloy steel; the Blades from special alloy steel forgings, resulting in a tool of great strength. The Safety feature of the Baker Wall Scraper lies in the fact that the Blades *always* close into the Body when coming out of the hole. To our knowledge, no Baker Wall Scraper has ever failed to safely come out of the well, leaving the hole in condition for further operations.**

### *AMAZING REAMING CAPACITY*

**Tool has been carefully engineered to provide tremendous strength with relatively small minimum overall dimensions, and with great underreaming capacity. For example, a No. 6 Scraper will readily run through 9⅝" A.P.I. casing and then will ream from a minimum of 9¼" to a maximum of 19", depending upon the gauge of the Blades in use.**

### *EFFICIENT OPERATION*

**The following construction features assure efficient operation of the Baker Rotary Wall Scraper:**

**(a) Long-bearing surface of Blades against formation assists in preventing tool from corkscrewing and assures scraping full-gauge hole.**
**(b) Cutting surfaces of Scraper Blades are hard-faced with tungsten carbide inserts. This means maximum cutting life.**
**(c) Pilot bit projects into smaller diameter hole ahead of Scraper, helping center the tool and steady the cutting action.**
**(d) Circulating fluids are directed on the Blades, lubricating and cleaning cutting surfaces.**
**(e) Circulation screen is designed to resist abrasive action of sand-ladened fluids and prevents debris from clogging circulation passages.**
**(f) Efficient type Plunger Head with oil resistant seals assures positive Blade opening.**
**(g) Strong plunger spring closes Blade into Body when work is done.**

### TWO TOOLS IN ONE

**Merely substituting a special set of Sampler Blades for the regular Wall Scraper Blades converts the tool into a Baker Wall Sampler, an efficient device for taking cores from the side walls of an open hole. This "two tools in one" feature means double value for your money.**

## BAKER ROTARY CASING SCRAPER
**(Product No. 620)**

**USE:**

**For scraping and cleaning the inside walls of casing. Following a cementing job, it can be used to remove the sheath or thin wall of hardened cement which usually adheres to the inside walls of the casing even after a maximum gauge bit has been used to drill out the cement or tailings left in the lower end of a cemented string of casing. It is also adaptable for the removal of most any type of substance or material (such as paraffine, etc.) deposited or adhering to the inside of the casing walls. Other specific uses for a tool of this type will readily suggest themselves to progressive operators.**

### IMPORTANT FEATURES:

**Tool is amply strong and can be run with absolute safety;**

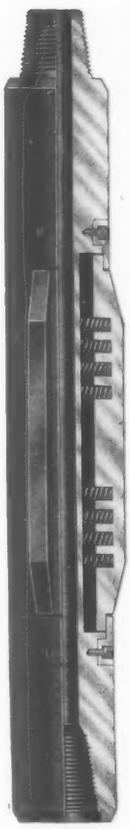
**It is simple in construction and has few working parts;**

**Device is easy to operate — any experienced driller can secure successful results with a Baker Casing Scraper;**

**Blades are self-adjusting, providing smooth, clean scraping action;**

**Pressure on Blades can be adjusted by varying number of Springs used behind each Blade. This permits proper adjustment for either light or heavy scraping work;**

**Casing Scraper affords low-cost method of cleaning substances from inside of casing walls.**



***Product No. 620***
***Baker Rotary Casing Scraper***

## BAKER MODEL "B" CASING CENTRALIZER
**(Product No. 910)**

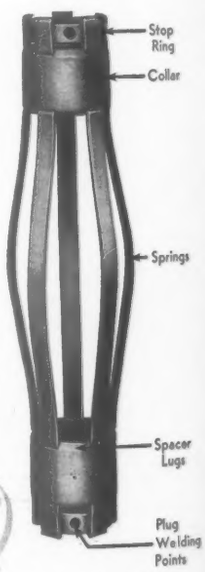
**USE:**

**For effectively centering casing in the hole, thus providing a uniform annulus. This uniform annulus permits best possible chance for complete encasement of the pipe at the cementing points with a uniform body of cement, minimizing the hazard of channeling.**

### OUTSTANDING FEATURES:

**Unit is amply strong and simply constructed. The Springs being made of 3/16"x1½" heat treated spring steel;**

**Unit employs a particularly efficient type of operating principle. Regardless of whether Centralizer is being raised or lowered, the unit is always *pulled* past a restriction in the hole. This pulling action, rather than pushing, eliminates any hazard of damaging the Springs or impairing their centering efficiency while the casing is being landed.**




***Product No. 910***
***Baker Model "B" Casing Centralizer***

*For complete details concerning the above tools, see pages 233, 265 and 272 of the 1941 Baker or Composite Catalog; or get in touch with the nearest Baker Office or field representative.*

## BAKER OIL TOOLS, INC.

**MAIN OFFICE AND FACTORY:**
**6000 South Boyle Avenue, P.O. Box 127, Vernon Station, Los Angeles, Calif.**
**CENTRAL DIVISION OFFICE AND FACTORY:**
**6023 Navigation Boulevard, P.O. Box 3048, Houston, Texas**
**EXPORT SALES OFFICE: 19 Rector St., Rm. 1914, New York, N. Y.**

**SOUTH AMERICAN REPRESENTATIVES:**

**Mr. S. B. Schnitter, No. 4 Mary Street, Port of Spain, Trinidad, B.W.I.**

**Messrs. J. Sanchez and Donavan Grable, Defensa 320, Buenos Aires, Argentina**

were scrubbed with caustic solution and analyzed by distillation through a low temperature Podbielniak column. The fractions were collected and further analyzed in a Goeckel absorption system. The complete gas analyses on the hydrogen sulfide-free basis are reported. In addition, hydrogen sulfide determinations were run directly at the plant on small stream samples taken at intervals during these tests. The average of these results is recorded as the hydrogen sulfide content of the gas in each case. Each of the stabilized gasolines was analyzed by distillation through a high-temperature Podbielniak column, the overhead being further fractionated in a low-temperature column and the fractions collected and analyzed in a Goeckel absorption system. The properties of the debutanized gasoline were also determined as shown in Table 4. The yield of pentanes and heavier hydrocarbons from the gas reported as liquid volume per cent of the cracking-plant charge is the amount which would be recovered in an absorption system assuming complete recovery of these fractions.

## Olefins may Be Polymerized

The olefins contained in the cracking-plant gas and gasoline may be polymerized in a solid phosphoric catalytic unit to produce a high octane number polymer. It is estimated that by deep stabilization and catalytic polymerization 6.4 per cent additional gasoline may be produced in coking the topped crude and 4.2 per cent may be similarly obtained in coking the reduced crude. Blending the polymer with the cracked gasoline produced would increase the octane number 1 to 1.5 points in each case. Alternately the butylenes from the cracking-plant gases may be reacted with the isobutane to produce alkylate for use in aviation-gasoline blends. When considering the gas and gasoline produced in coking the topped and reduced crudes and assuming that the amount of butylenes available from the gas and gasoline is the limiting factor the predicted yields would be 7.4 per cent and 6.1 per cent of the rerun alkylate based on the topped and reduced crude-cracking stocks, respectively. This would require additional isobutane from an outside source for alkylation.

## Stabilized Gasoline Sweetened

In order to complete the inspection of the cracked gasolines representative samples of the stabilized gasoline from the coking operation on both the topped and reduced crudes were sweetened with doctor solution and inspected with and without the addition of inhibitor. The properties of the treated gasolines are reported in Table 5 together with the properties of the untreated material for comparison. In spite of the rather high peroxide numbers the doctor-sweetened cracked gasolines show a good response to the addition of small quantities of inhibitor. A reduction in octane rating of 0.5 point is incurred in the sweetening operation.

An over-all summary of the yields obtained in processing the Arabian topped and reduced crudes is shown in Table 6. Including the estimated catalytic-polymer yield and the pentanes from the cracking-plant gas the total gasoline yield would be 77.8 per cent when coking the topped crude. Similarly, a total yield of 67.4 per cent would be obtained in coking the reduced crude. In each case there is a slight deficiency of butanes for blending the final fuel to vapor pressure. This amount of butane would be required from an outside source when polymerizing all of the available olefins in the gas and gasoline and producing a 10-lb. Reid vapor pressure final gasoline blend.

**TABLE 3—ANALYSIS OF CRACKING-PLANT GAS AND GASOLINE**

| Charging stock: | Topped crude | | | Reduced crude | | |
|---|---|---|---|---|---|---|
| Type of residue: | Coke | | Liquid residuum | Coke | | Liquid residuum |
| Gas stream: | Coke chamber | Receiver and stabilizer | | Coke chamber | Receiver and stabilizer | |
| Specific gravity: (Air = 1.00) | 0.80 | 1.16 | 1.18 | 0.80 | 1.12 | 1.14 |
| Composition, per cent by vol. ($H_2S$-free basis): | | | | | | |
| Hydrogen | 10.5 | 4.2 | 3.3 | 8.6 | 3.8 | 4.4 |
| Nitrogen | 4.8 | 1.6 | 1.1 | 3.5 | 2.2 | 2.3 |
| Carbon monoxide | 0.4 | 0.1 | 0.0 | 0.1 | 0.0 | 0.2 |
| Methane | 52.9 | 14.9 | 18.9 | 55.7 | 20.4 | 23.2 |
| Ethylene | 1.0 | 4.7 | 4.2 | 0.4 | 4.3 | 3.9 |
| Ethane | 17.0 | 25.4 | 22.6 | 16.9 | 22.9 | 20.0 |
| Propylene | 1.9 | 14.6 | 17.8 | 1.2 | 6.6 | 13.5 |
| Propane | 6.4 | 22.1 | 22.7 | 7.2 | 31.0 | 20.5 |
| Isobutylene | ... | 2.2 | 1.5 | ... | 0.9 | 1.5 |
| 1-butylene | ... | 3.2 | ... | ... | 1.3 | ... |
| 2-butylene | •1.2 | 0.9 | ‡2.4 | •1.1 | 0.9 | ‡4.3 |
| Isobutane | ... | 2.2 | ... | ... | 1.1 | ... |
| *n*-Butane | †2.4 | 2.5 | †3.3 | †3.5 | 2.7 | †2.9 |
| Pentanes and heavier hydrocarbons | 1.5 | 1.4 | 2.2 | 1.8 | 1.9 | 3.3 |
| Total | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 |
| Unsaturates | 4.1 | 25.6 | 25.9 | 2.7 | 14.0 | 23.2 |
| Propylene and butylenes | 3.1 | 20.9 | 21.7 | 2.3 | 9.7 | 19.3 |
| Pentanes and heavier hydrocarbons (as liquid) gal./1,000 cu. ft. | 0.55 | 0.51 | 0.80 | 0.66 | 0.69 | 1.20 |
| Per cent by volume of charge | 0.3 | 0.7 | 0.7 | 0.8 | 0.8 | 0.9 |
| Hydrogen sulfide, Tutwiler: | | | | | | |
| Grains/100 cu. ft. | 1,950 | 640 | 760 | 2,720 | 1,630 | 1,400 |
| Volume, per cent | 3.1 | 1.0 | 1.2 | 4.3 | 2.6 | 2.2 |
| Stabilized gasoline composition: | | | | | | |
| Liquid volume, per cent: | | | | | | |
| Total $C_3$ fractions | ... | 0.00 | 0.03 | ... | 0.02 | 0.06 |
| Isobutylene | ... | 0.78 | 0.94 | ... | 0.98 | 0.95 |
| 1-butylene | ... | 1.16 | ... | ... | 1.62 | ... |
| 2-butylene | ... | 1.26 | ‡2.47 | ... | 1.78 | ‡2.76 |
| Isobutane | ... | 0.45 | ... | ... | 1.01 | ... |
| *n*-Butane | ... | 3.12 | †2.98 | ... | 4.58 | †6.63 |
| Pentanes to 115° F. | ... | 11.72 | 8.38 | ... | 10.91 | 9.76 |
| Fraction boiling above 115° F. | ... | 81.51 | 85.20 | ... | 79.10 | 79.84 |
| Total | ... | 100.00 | 100.00 | ... | 100.00 | 100.00 |
| Fraction boiling above 115° F.: | | | | | | |
| Gravity, °A.P.I. | ... | 53.4 | 54.0 | ... | 53.2 | 53.3 |

•Total butylenes. †Total butanes. ‡Total *n*-butylenes.

**TABLE 4—PROPERTIES OF DEBUTANIZED GASOLINES**

| Charging stock: | Topped crude | | Reduced crude | |
|---|---|---|---|---|
| Type of residue: | Coke | Liquid | Coke | Liquid |
| Debutanized gasoline properties: | | | | |
| Gravity, °A.P.I. | 57.3 | 55.7 | 58.6 | 57.2 |
| Total sulfur, per cent | 0.12 | 0.13 | 0.16 | .25 |
| Mercaptan sulfur, per cent | 0.04 | 0.03 | 0.04 | 0.05 |
| Reid vapor pressure, lb. | 5.6 | 4.5 | 4.2 | 5.1 |
| Octane number, C.F.R. Motor | 65 | 62.5 | 64 | 65 |
| 100 cc. distillation: | | | | |
| I.B.P., °F. | 126 | 124 | 135 | 119 |
| 5 per cent | 154 | 161 | 157 | 150 |
| 10 | 165 | 180 | 170 | 164 |
| 30 | 210 | 226 | 207 | 212 |
| 50 | 261 | 281 | 254 | 261 |
| 70 | 309 | 326 | 296 | 310 |
| 90 | 354 | 368 | 348 | 363 |
| E.P., °F. | 401 | 406 | 399 | 413 |
| Per cent over | 99.0 | 98.5 | 98.5 | 98.5 |
| Per cent bottoms | 1.0 | 1.5 | 1.5 | 1.5 |

**TABLE 5—LABORATORY TREATMENT OF CRACKED GASOLINE**

| Charging stock: | Topped crude | | Reduced crude | |
|---|---|---|---|---|
| Type of residue: | Coke | | Coke | |
| Gasoline treatment | None | Sweetened | None | Sweetened |
| Properties of gasoline: | | | | |
| Gravity, °A.P.I. | 59.6 | 59.5 | 61.3 | 60.9 |
| Total sulfur, per cent | 0.11 | 0.11 | 0.15 | 0.15 |
| Mercaptan sulfur, per cent | 0.04 | ... | 0.04 | ... |
| Reid vapor pressure, lb. | 9.2 | 9.1 | 9.6 | 9.3 |
| Octane number, C.F.R. Motor | 67 | 66.5 | 67.5 | 67 |
| Color, °Saybolt | Yellow | ... | Yellow | ... |
| Doctor test | Positive | Negative | Positive | Negative |
| Peroxide number | 1.94 | ... | 2.08 | ... |
| Copper dish gums, mg./100 cc.: | | | | |
| Without inhibitor | 300 | 352 | 265 | 305 |
| With U.O.P. inhibitor No. 1, 0.025 per cent | ... | 12 | ... | 42 |
| With U.O.P. inhibitor No. 1, 0.05 per cent | ... | 6 | ... | 3 |
| With U.O.P. inhibitor No. 4, 0.005 per cent | ... | 28 | ... | 17 |
| With U.O.P. inhibitor No. 4, 0.01 per cent | ... | 5 | ... | 7 |
| Oxygen bomb induction period, minutes: | | | | |
| Without inhibitor | 100 | 105 | 110 | 115 |
| With U.O.P. inhibitor No. 1, 0.025 per cent | ... | 280 | ... | 270 |
| With U.O.P. inhibitor No. 1, 0.05 per cent | ... | 395 | ... | 355 |
| With U.O.P. inhibitor No. 4, 0.005 per cent | ... | 250 | ... | 200 |
| With U.O.P. inhibitor No. 4, 0.01 per cent | ... | 315 | ... | 340 |
| 100 cc. distillation: | | | | |
| I.B.P., °F. | 100 | 102 | 95 | 100 |
| 10 per cent | 139 | 139 | 132 | 140 |
| 50 | 257 | 256 | 242 | 242 |
| 90 | 350 | 350 | 357 | 357 |
| E.P., °F. | 394 | 396 | 395 | 395 |

**TABLE 6—YIELD SUMMARY**

| Charging stock: | Topped crude | | Reduced crude | |
|---|---|---|---|---|
| Type of residue: | Coke | Liquid residuum | Coke | Liquid residuum |
| Yields, volume per cent of charge: | | | | |
| Gasoline | 70.3 | 56.1 | 61.4 | 33.1 |
| Pentanes and heavier hydrocarbons from gas | 1.0 | 0.7 | 1.6 | 0.9 |
| Estimated catalytic polymer, 10-lb. R.v.p. | 6.5 | 4.3 | 4.4 | 2.9 |
| Total gasoline | 77.8 | 61.1 | 67.4 | 36.9 |
| Excess $C_4$ before polymerization | 4.8 | 2.0 | 3.8 | 1.6 |
| $C_4$ deficiency after polymerization | 0.1 | 1.0 | 0.2 | 0.6 |
| Residuum | | 36.4 | | 61.8 |
| Liquid recovery including polymer | 77.8 | 97.5 | 67.4 | 98.7 |
| Liquid volume loss | 22.2 | 2.5 | 32.6 | 1.3 |
| Coke, lb./bbl. of charge | 62 | .. | 104 | . |

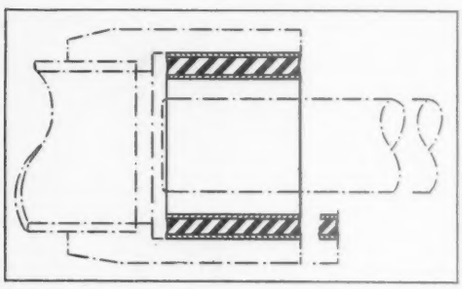
# Progress in METALS

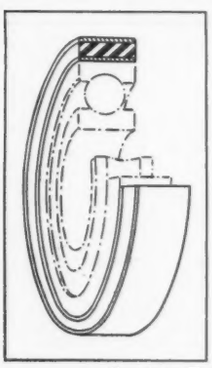
By W. L. NELSON

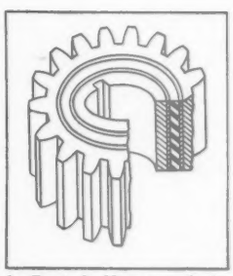
## Flexible Bearings, Bushings And Gears

THE E. I. du Pont de Nemours & Co. has recently been active in the development of neoprene or rubber-insulated gears, bearings, etc. To a large extent the following discussion and figures were taken from the Neoprene Notebook of September-October 1941.

An unusual type of flexible bearing or bushing which consists essentially of a rubber or neoprene member held between two metal tubes has been widely applied in the solution of difficult mounting problems. This interesting design involves the use of two metal tubes, one considerably larger than the other, and a section of resilient tubing.







Courtesy E. I. du Pont de Nemours & Co.

***Top: Bushing application on motor provides electric insulation and reduces starting torque. Above, left: Ball bearing mounted in bushing which absorbs shock, prolongs bearing life and reduces noise. Above, right: Used on presses to absorb shock, this gear gives over four times the life of "uninsulated" gears***

The size of the metal tubes is selected so that the difference between the inner diameter of the larger and the outer diameter of the smaller is less than the wall thickness of the resilient member that is to be inserted between them. In the manufacture, the tube of resilient material is first stretched mechanically. While this elastic tube is still stretched, with a consequent reduction in cross-section, the metal shells are slipped inside of it and over it. Then the force on the resilient tube is released and it is allowed to seek its original cross-section. Because this resilient tube can never return completely to its unstretched condition, it exerts a constant pressure against the metal. This pressure results in a high frictional resistance against movement between the resilient material and the metal. Slippage between the two parts will occur only when considerable overload beyond the rated capacity is imposed. The method of manufacture permits an almost unlimited combination of rubber thicknesses and lengths with suitable inner and outer tubes of graphited bronze, brass or even stainless steel for use as a vibration dampener, shock absorber, noise eliminator, etc.

The accompanying illustrations show a few of the many applications made to date. Neoprene is used where the bearing may be exposed to oils, chemicals, heat or ozone. In every such case, bearings correctly applied have been satisfactory.

The design further offers the possibility of the use of the bearing as a low cost overload device for various types of power-driven equipment liable to only occasional overload of short duration. When the beearing is greatly overloaded, the mechanical bond between the resilient wall and the inner sleeve will slip intermittently. This slippage is momentary and when the overload is reduced the resilient wall immediately resumes its grip on the inner metal tube with its original load capacity. Under overload conditions the fibers of the rubber (or neoprene) wall are twisted. The twisting or "winding up" of the fibers of the material has the effect of contracting the thickness of the rubber, thus permitting slip to occur.

Thus a simple device has been expanded to application not even considered in the original plans. It is only through such constant progress that design profitably advances.

## Heat Treatment of Substitute High-Speed Steels Of the Molybdenum Type

LAST June the OPM declared a shortage of tungsten, and metallurgical engineers tackled the problem of relieving that shortage in deadly earnest. The importance of tungsten lies in its use as the main constituent of high-speed steels. These steels are necessary for the cutting tools that are used in most mass-production operations. The obvious answer was the use of molybdenum, which has already proven its suitability as a base for high-speed tool steel.

A special committee for the study of this situation was appointed by the OPM, and a report has been prepared concerning the heat treatment of molybdenum high-speed steels. The committee members are N. I. Stotz, chairman, J. H. McCadie, W. H. Wills, F. L. Woodsie, and J. E. Donnellan, secretary, and the report may be obtained from the Office of Production Management, Social Security Building, Washington, D. C. Two other committees were employed in preparing special parts of the report pertaining to salt-bath furnaces and controlled-atmosphere furnaces.

The report is much too long to be given here or even completely abstracted, but certain main features can be given. The compositions of the main molybdenum tool steels are given in Table 1, and heat-treating temperatures in Table 2.

**TABLE 1—COMPOSITIONS FOR MOLYBDENUM HIGH-SPEED STEELS**

| | Type 1 molybdenum-tungsten | | Type 2 molybdenum-vanadium | Type 3 tungsten-molybdenum |
|---|---|---|---|---|
| | (a) | (b*) | | |
| C | 0.70-0.85 | 0.76-0.82 | 0.70-0.90 | 0.75-0.90 |
| W | 1.25-2.00 | 1.60-2.30 | .... | 5.00-6.00 |
| Cr | 3.00-5.00 | 3.70-4.20 | 3.00-5.00 | 3.50-5.00 |
| V | 0.90-1.50 | 1.05-1.35 | 1.50-2.25 | 1.25-1.75 |
| Mo | 8.00-9.50 | 8.00-9.00 | 7.50-9.50 | 3.50-5.50 |
| Co | See footnote | 4.50-5.50 | See footnote | See footnote |

*Cobalt may be used in any of these steels in varying amounts up to 9 per cent, and the vanadium may be as high as 2.25 per cent. When cobalt is used in Type 3, this steel becomes susceptible to decarburization. As an illustration of the use of cobalt, Type 1b is included. This is steel T10 in the U. S. Navy Specification 46S37, dated November 1, 1939.

**TABLE 2—HEAT TREATMENT OF MOLYBDENUM HIGH-SPEED STEELS**

| | Type 1 molybdenum-tungsten a and b (°F.) | Type 2 molybdenum-vanadium (°F.) | Type 3 tungsten-molybdenum (°F.) |
|---|---|---|---|
| Forging | 1,850-2,000 | 1,850-2,000 | 1,900-2,050 |
| Not below | 1,600 | 1,600 | 1,600 |
| Annealing | 1,450-1,550 | 1,450-1,550 | 1,450-1,550 |
| Strain relief | 1,150-1,350 | 1,150-1,350 | 1,150-1,350 |
| Preheating | 1,250-1,500 | 1,250-1,500 | 1,250-1,550 |
| Hardening | 2,150-2,250 | 2,150-2,250 | 2,175-2,275 |
| Salt | 2,150-2,225 | 2,150-2,225 | 2,150-2,250 |
| Tempering | 950-1,100 | 950-1,100 | 950-1,100 |

Under similar conditions Type b requires a slightly higher hardening heat than Type a. The higher side of the hardening range should be used for the large sections and the lower side for the small sections.

"It should be borne in mind that where hardening equipment is available in which decarburization can be controlled, there is no particular problem involved in replacing the tungsten high-speed steel with the proper molybdenum high-speed steel. There are differences in hardening temperatures and timing cycles, but the broad general principles are similar. Where proper equipment does not exist, the special precautions indicated below should be helpful.

"For those who are not skilled in handling molybdenum high-speed steels and who do not have decarburization under good control, it is recommended that at present they adopt the following procedure:

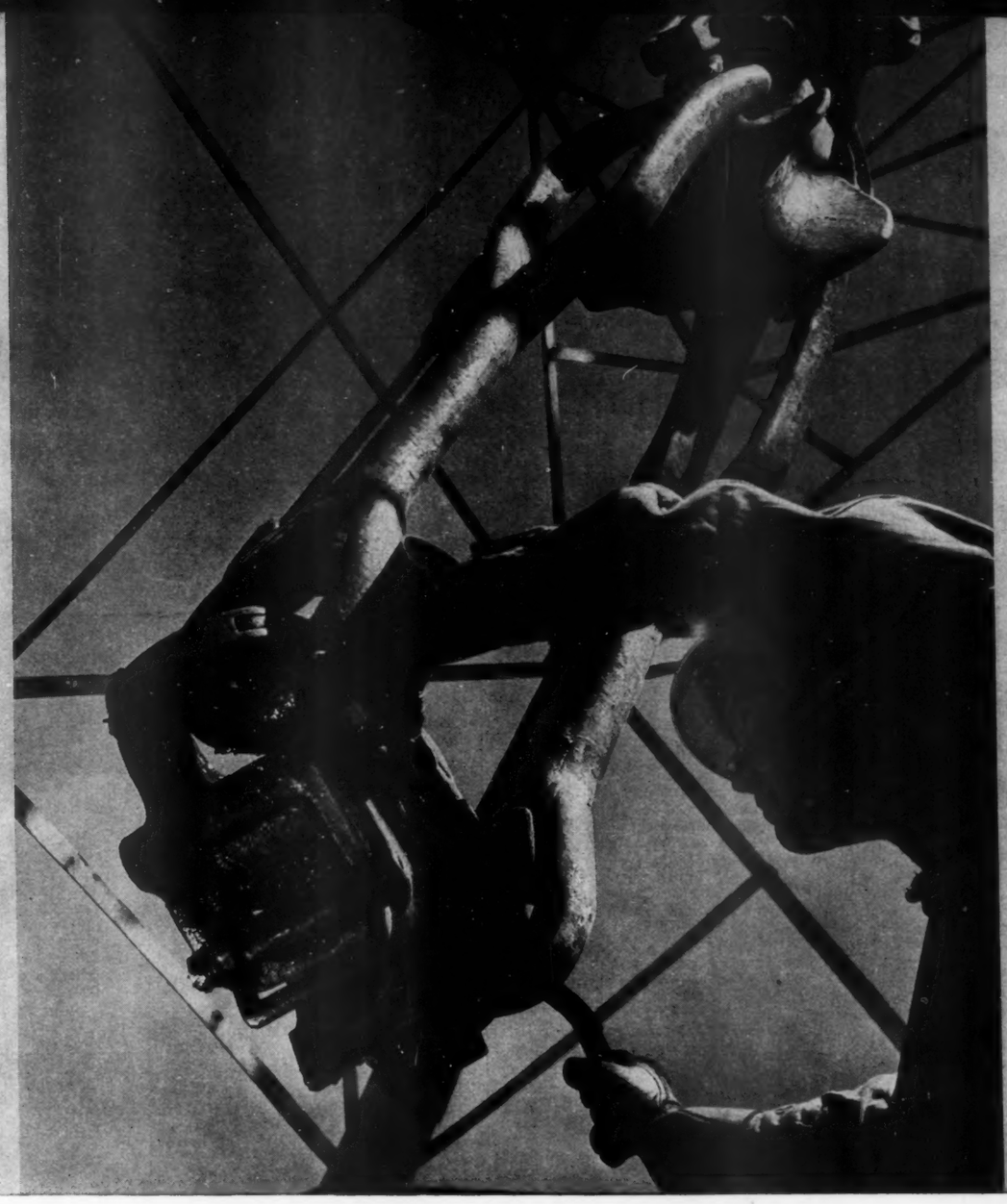
"1. Use the required substitution of molybdenum high-speed steels, selecting the type that will produce the best results and give the least trouble in working. The smaller tools are heat-treated by shorter cycles and thus the general hazards are less.

"2. Proceed on the basis that steels of Type 3 decarburize less than steels of Types 1 and 2. In most cases, steels of Type 3 can be treated without surface protection in the same equipment used for tungsten high-steed steels.

"3. Consult with the firms from whom you purchase your high-speed steels for their best advice in the light of your particular problem.

"4. Take steps to obtain modern efficient hardening equipment on the premise that regardless of the kind of high-speed steel being hardened, proper hardening promotes better tool life, and better tool life in itself is a big step in conservation."

Topics which are discussed in the report are composition of molybdenum high-speed tool steels; forging; heat-treating operations such as annealing, hardening, quenching, straightening and tempering; salt-bath furnaces; controlled-atmosphere furnaces; and coatings.



# A BAIL IS NO BETTER THAN ITS STEEL

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The service of 4140 in this particular application is typical of what Molybdenum steels of various analyses are doing in the interest of economical drilling at many points in the rig. These steels and their uses are fully described in our technical book, "Molybdenum Steel in Oil Production", which will be sent free on request.

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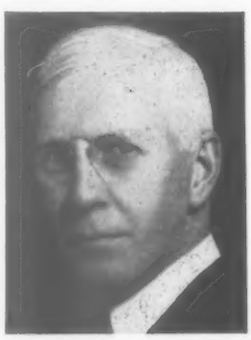

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(Continued on Page 164)

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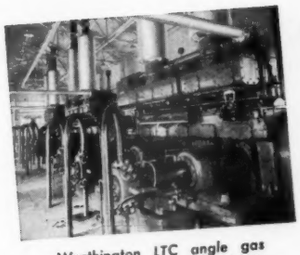
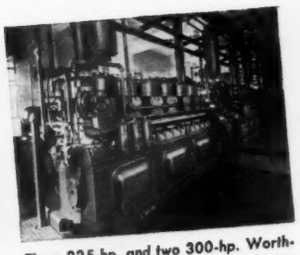


Worthington LTC angle gas engine compressor, available in nine sizes, 150-hp. to 1000-hp.

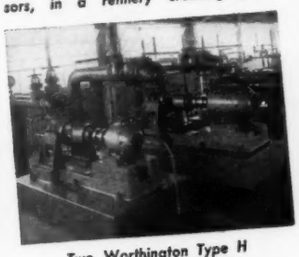


Three 225-hp. and two 300-hp. Worthington angle gas engine compressors, in a refinery cracking plant

One of two Worthington 8-cylinder 1000-hp. convertible gas-Diesel engines, in general power service

Worthington 180-hp. vertical gas engine, for auxiliary service, in a mid-western oil pipe line station

Worthington centrifugal hot charge pump, driven by Worthington vertical gas engine, in an eastern refinery

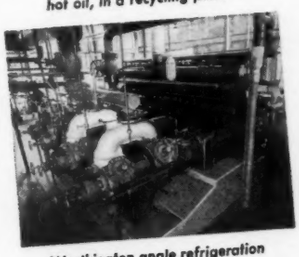


Two Worthington Type H centrifugal pumps handling hot oil, in a recycling plant

One of three Worthington duplex pumps, motor-driven, pumping cold oil at 1500 p.s.i. discharge pressure

Two Worthington centrifugal pipe line pumps driven, through fire wall, by Worthington 280-hp. Diesel engines

Worthington-Carbondale chilling machines, for ammonia direct-expansion operation in a solvent dewaxing plant



Worthington angle refrigeration compressor with ammonia cylinders in a dewaxing plant

Worthington horizontal duplex power pumps on water repressuring service

Hydraulic decoking systems for removal and transportation of coke from coke chambers in refineries

Worthington rotary pump, gas-gasoline engine driven, in gathering service in the oil fields

Worthington HiVoL direct-acting pumps, handling gasoline, in refinery service

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Worthington power pump driven by gasoline engine with Worthington Multi-V-Drive, in oil gathering service

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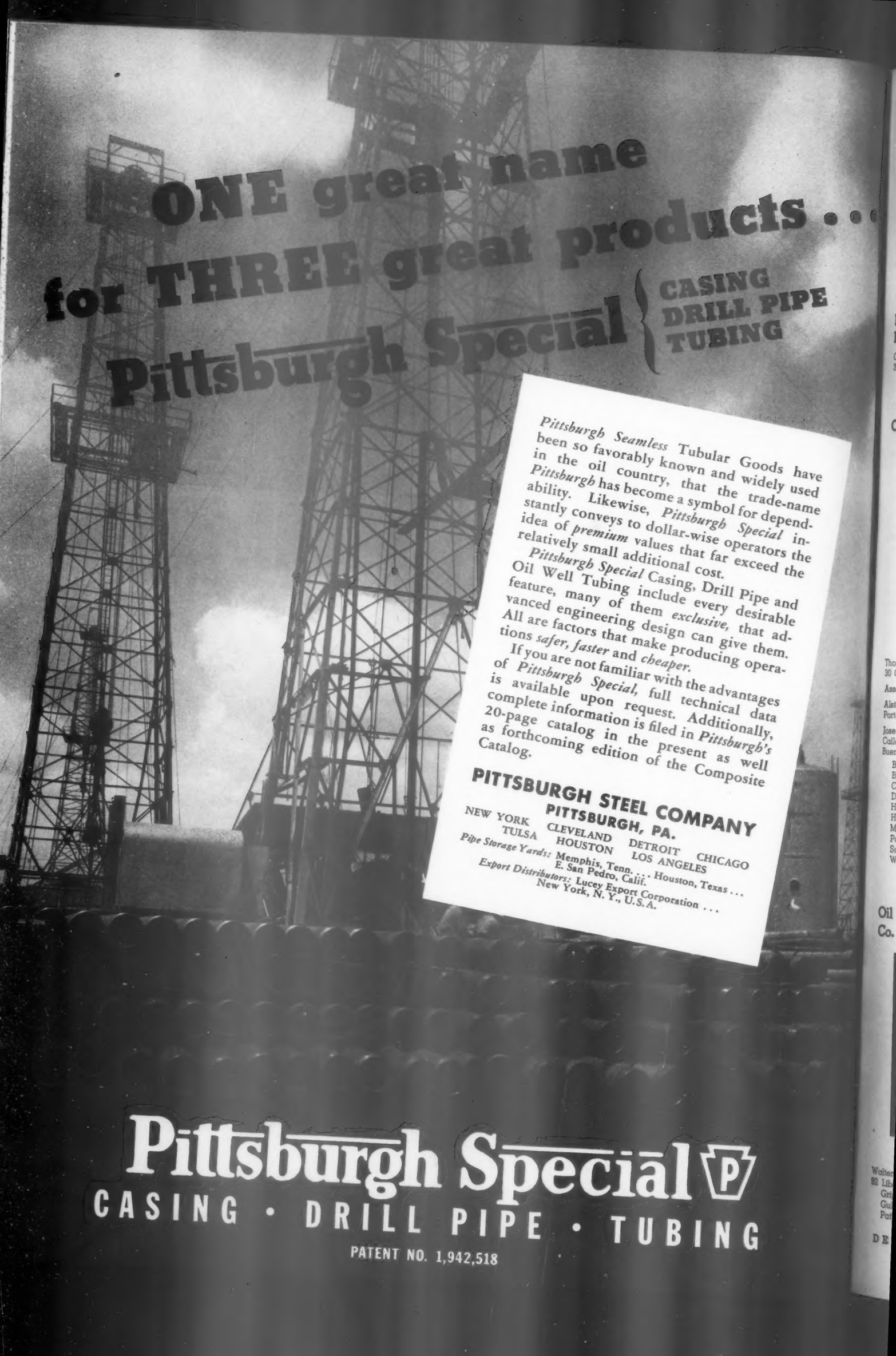
(Continued on Page 167)

The crest and crowning of all good,
Life's final star, is Brotherhood;
For it will bring again to earth
Her long-lost Poesy and Mirth;
Will send new light on every face,
A kingly power upon the race.
And till it comes, we men are slaves,
And travel downward to the dust of graves.

Come, clear the way, then, clear the way:
Blind creeds and kings have had their day.
Break the dead branches from the path:
Our hope is in the aftermath —
Our hope is in heroic men,
Star-led to build the world again.
To this event the ages ran:
Make way for Brotherhood — make way
for Man!

"Brotherhood," by Edwin Markham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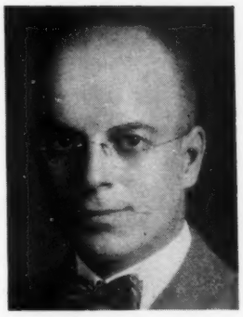

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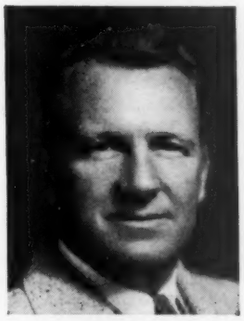

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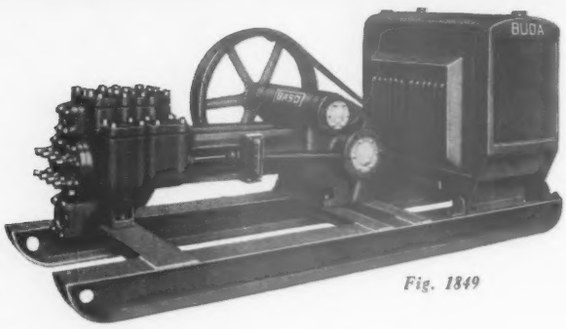



*Fig. 1849*

## SERIES 1800—POWER PUMPS

GASO Figure 1849 Pump is adaptable for any service such as water lines, gathering systems, booster stations, or acidizing. Light in weight, compact and complete, it is ideal to meet conditions in declining fields or on smaller leases. Pump is illustrated with gas or gasoline engine drive.

The same features will be found in this pump as in models of much higher price. Crankcase is enclosed and provides a reservoir for holding oil bath which lubricates the gears, crossheads and connecting rod bearings. Main and pinion bearings are Timken Tapered Roller Bearings, enclosed in cast iron housings and sealed off from crankcase. Timken bearings are oiled from outside, one filling sufficing for months of steady operation.

Fluid ends are interchangeable liner type. We can furnish special alloy steel liners or bronze liners for specific service; also all-acid-resisting-bronze fluid end for acid service. Pump can be arranged for any type drive. Cylinder sizes 2½"x6" to 4"x6".

FIGURE 1844 and 1849

| Size Pump | RATING | | | R.P.M. | Pipe Size | | Pump Fig. No. |
|---|---|---|---|---|---|---|---|
| | Gallons per Min. | Barrels per Hr. | Working Pressure | | Suc., In. | Dis., In. | |
| 2½"x6" | 32 | 46 | 900 | 70 | 4 | 2 | 1844-1849 |
| 3" x6" | 47 | 67 | 600 | 70 | 4 | 2 | 1844-1849 |
| 3½"x6" | 65 | 93 | 450 | 70 | 4 | 2 | 1844-1849 |
| 4" x6" | 88 | 126 | 350 | 70 | 4 | 2 | 1844-1849 |

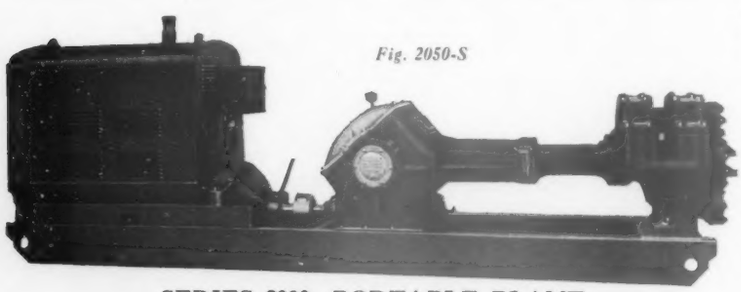


*Fig. 2050-S*

## SERIES 2000—PORTABLE PLANT

GASO Series 2000 Portable Pumping Plants, mounted on trailers or skids, are particularly adapted for emergency, temporary or semi-permanent oil field service, such as water lines, gathering systems, booster stations and pick-up service.

Pumps have the recognized Gaso features, including enclosed crankcase, working parts running in oil bath and Timken Bearings sealed off from crankcase. Figures Nos. 2019 and 2050 have fluid ends with interchangeable liners in sizes from 2½" x 10" to 5" x 10". Fluid ends on Figure 2017 pumps, available in either 6" x 10" or 7" x 10" sizes, have rolled-in brass liners.

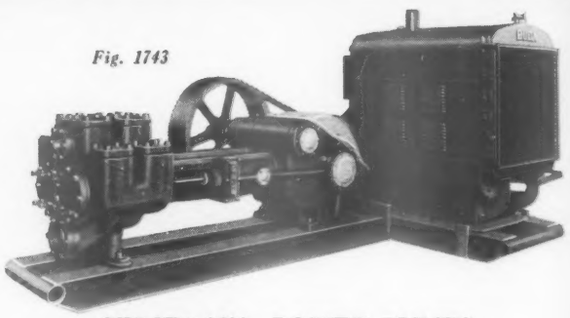
Power unit is 4-cylinder, extra heavy duty oil field type engine, of medium speed, burning natural residue gas or gasoline.

Smaller portable units are available in the Gaso line in our Series 2200 Pumping Plants, with capacities from 46 to 126 bbls. per hour.

FIGURE 2017-2019 and 2050

| Size Pump | Displacement | | Working Pressure | R.P.M. | Size Pipe | | Pump Fig. No. |
|---|---|---|---|---|---|---|---|
| | Gals. per Min. | Bbls. per Hr. | | | Suc. | Dis. | |
| 2¼"x10" | 41 | 59 | 1000 | 54 | 4" | 3" | 2019-2050 |
| 3" x10" | 61 | 87 | 700 | 54 | 4" | 3" | 2019-2050 |
| 3½"x10" | 85 | 122 | 500 | 54 | 4" | 3" | 2019-2050 |
| 4" x10" | 113 | 161 | 400 | 54 | 4" | 3" | 2019-2050 |
| 4½"x10" | 144 | 205 | 300 | 54 | 4" | 3" | 2019-2050 |
| 5" x10" | 179 | 255 | 250 | 54 | 4" | 3" | 2019-2050 |
| 6" x10" | 259 | 371 | 175 | 54 | 6" | 4" | 2017 |
| 7" x10" | 355 | 508 | 125 | 54 | 6" | 4" | 2017 |

*Fig. 1743*



## SERIES 1700—POWER PUMPS

These pumps are designed to pump oil or water through long lines at pressures from 300 to 1400 pounds. Are admirably suited for pumping large capacities at high pressures, having fluid ends with interchangeable liners from 2½" to 5" and from 5" to 7½" x 10" stroke.

These pumps possess all of the recognized GASO features. Crankcase is fully enclosed, and working parts operate in oil bath. Both pinion and crankshafts are journaled in Timken Tapered Roller Bearings sealed off from the crankcase. Fluid ends can be furnished with special alloy steel liners, chromonized, or cast iron liners, bronze lined. All pumps are standard brass fitted, with steel piston rods. We can furnish any type of valve construction. Pumps can be arranged for any type drive: (1) Pulley for belt drive, (2) direct connected to engine through flexible coupling, (3) electric motor through chain or reduction gears, (4) "V" Belt drive to electric motor or multiple cylinder power unit.

FIGURE 1740-1741-1742 and 1743

| Size Pump | DISPLACEMENT | | Working Pressure | R.P.M. | Pipe Size | | Pump Fig. No. |
|---|---|---|---|---|---|---|---|
| | Gal. per Min. | Bbl. per Hr. | | | Suc. | Dis. | |
| 2½"x10" | 38 | 54 | 1400 | 54 | 4" | 3" | 1740-1742 |
| 3" x10" | 57 | 82 | 1400 | 54 | 4" | 3" | 1740-1742 |
| 3½"x10" | 81 | 116 | 1200 | 54 | 4" | 3" | 1740-1742 |
| 4" x10" | 109 | 156 | 925 | 54 | 4" | 3" | 1740-1742-1743 |
| 4½"x10" | 140 | 200 | 725 | 54 | 4" | 3" | 1740-1742-1743 |
| 5" x10" | 175 | 250 | 600 | 54 | 4" | 3" | 1740-1742-1743 |
| 5" x10" | 175 | 250 | 600 | 54 | 6" | 4" | 1741-1743 |
| 5½"x10" | 213 | 305 | 500 | 54 | 6" | 4" | 1741-1743 |
| 6" x10" | 255 | 365 | 400 | 54 | 6" | 4" | 1741-1743 |
| 6½"x10" | 301 | 431 | 350 | 54 | 6" | 4" | 1741-1743 |
| 7" x10" | 351 | 502 | 300 | 54 | 6" | 4" | 1741-1743 |
| 7½"x10" | 405 | 578 | 260 | 54 | 6" | 4" | 1743 |

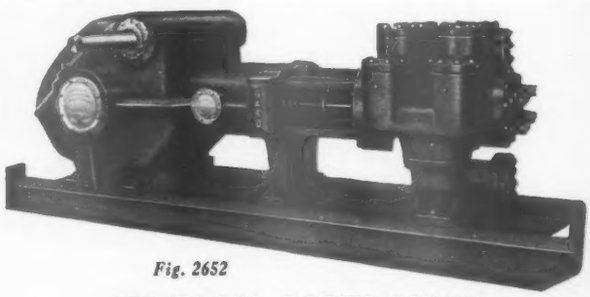


*Fig. 2652*

## SERIES 2600—POWER PUMPS

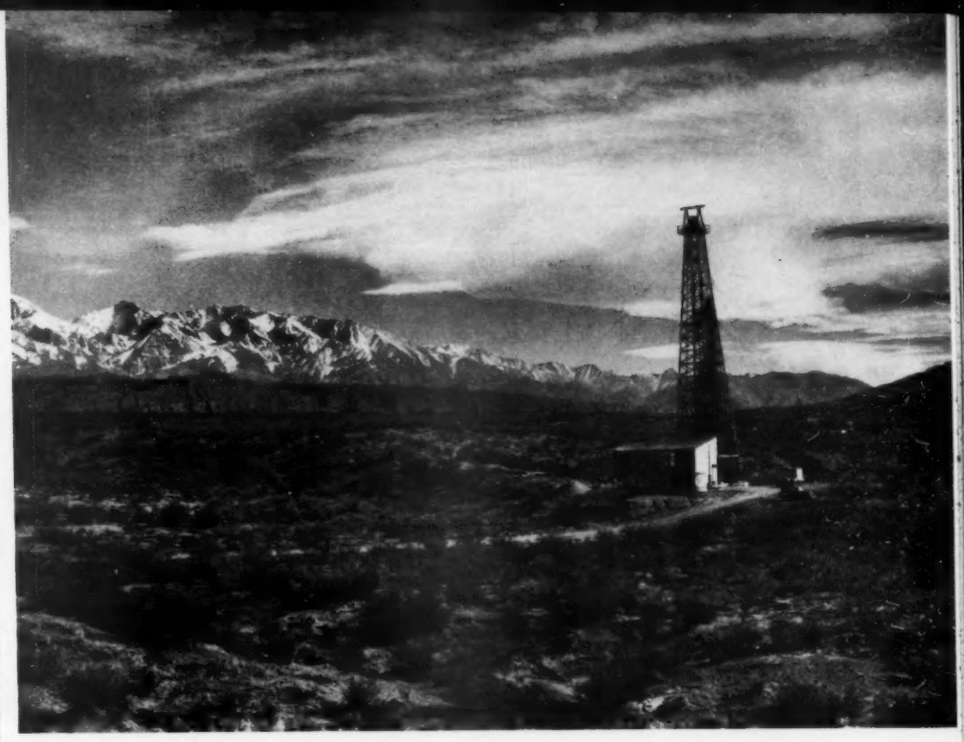
Our GASO Fig. 2652 12"-stroke pump, has approximately *double* the capacity-pressure rating of any other GASO model.

The GASO features of design which have become familiar throughout the industry are incorporated in this unit. Main gear is semi-steel, Herringbone construction; pinion gear is forged steel. Crankshaft is journaled in Timken Tapered Roller Bearings and pinion shaft in Hyatt Roller Bearings, sealed off from the crankcase. Fluid end is of side-pot type with all valves individually accessible. Any type drive can be supplied.

Fluid cylinders of interchangeable liner type, providing range in cylinder diameter of 4" to 7¼"—give the pump a capacity ranging from 176 bbls. per hour at 1500 lbs. pressure, to 637 bbl. per hour at 475 lbs. pressure.

FIGURE 2652—SIZES, CAPACITIES AND PRESSURES

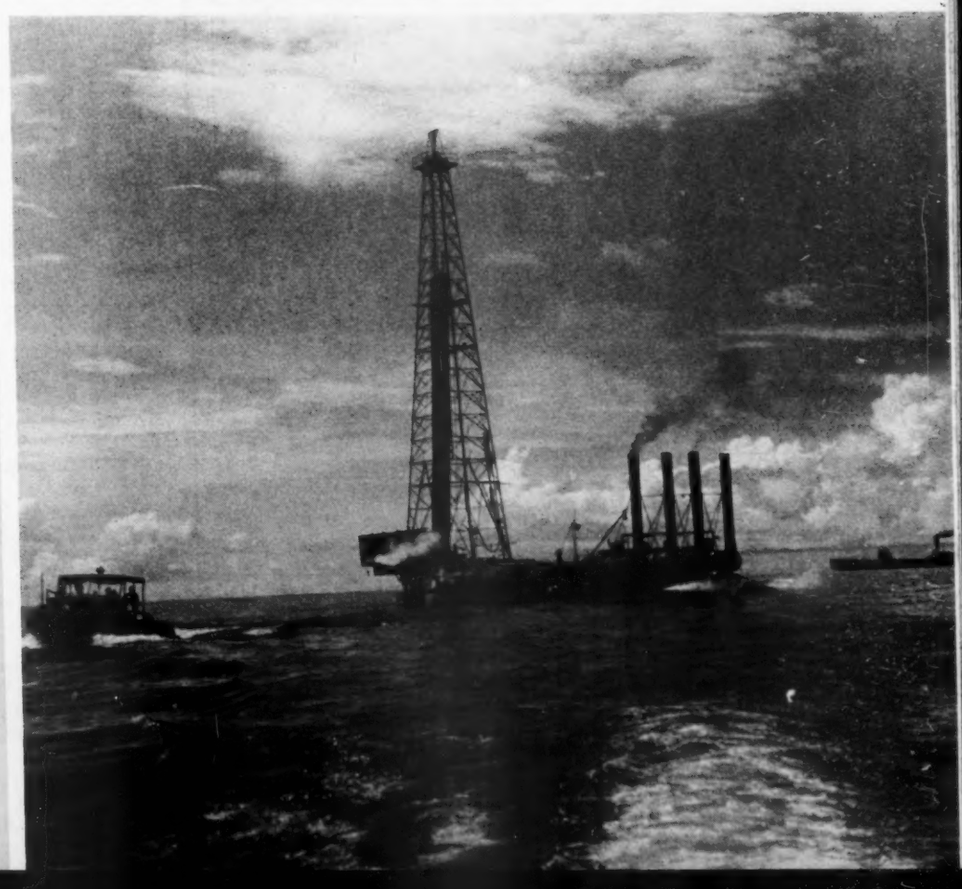
| SIZE | DISPLACEMENT | | Working Pressure | R.P.M. | PIPE SIZE | |
|---|---|---|---|---|---|---|
| | Gallons per Min. | Barrels per Hr. | | | Suction | Discharge |
| 4" x12" | 123 | 176 | 1500 | 54 | 8" | 4" |
| 4½"x12" | 161 | 230 | 1225 | 54 | 8" | 4" |
| 5" x12" | 202 | 289 | 1000 | 54 | 8" | 4" |
| 5½"x12" | 248 | 355 | 825 | 54 | 8" | 4" |
| 6" x12" | 300 | 428 | 700 | 54 | 8" | 4" |
| 6½"x12" | 355 | 507 | 600 | 54 | 8" | 4" |
| 7" x12" | 414 | 592 | 500 | 54 | 8" | 4" |
| 7¼"x12" | 446 | 637 | 475 | 54 | 8" | 4" |



Bilingual presentation of newest techniques in drilling, production, transportation and refinery engineering along with the newest practices in exploration and in the manufacture of natural gasoline.

# SPANISH ENGLISH SECTION

Sección bilingue, en la cual se describen las procedimientos y técnica más moderna en lo tocante a perforación, producción, exploración, transporte y refinería y la manufactura de gasolina natural.

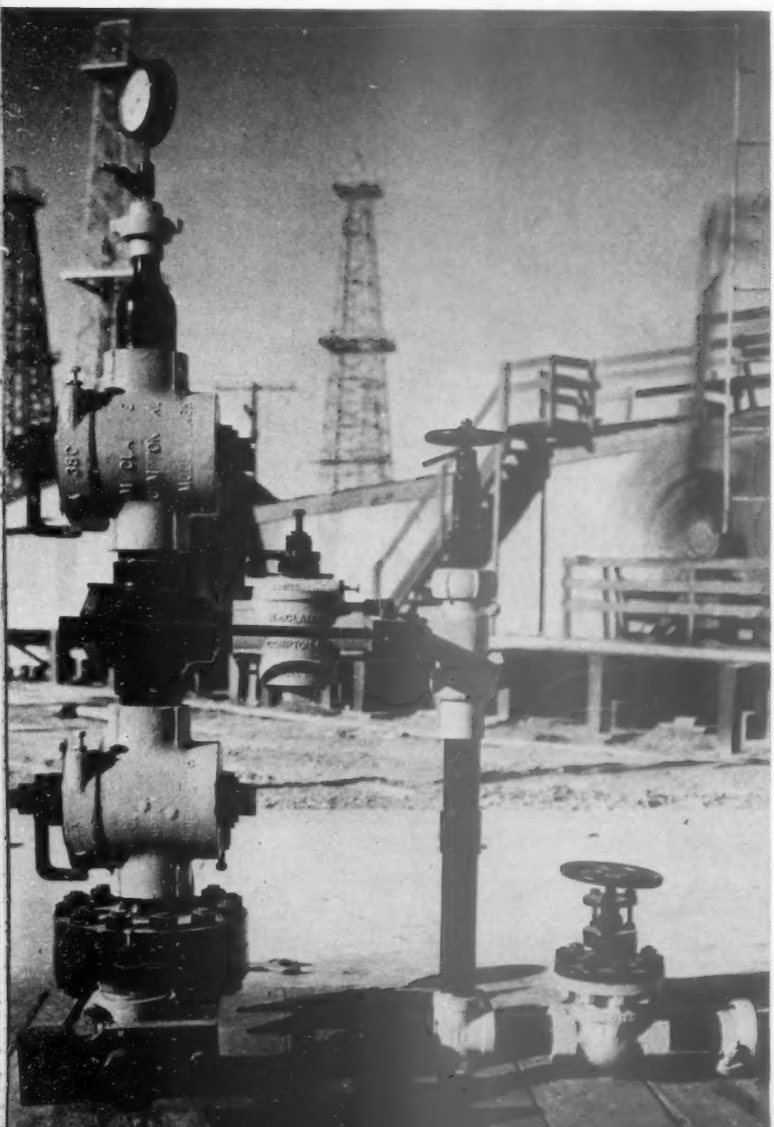


*Increase in the quality and the size of trucks used in the oil fields has permitted substantial reductions in the time required to move and rig up*

*El aumento en calidad y tamaño de los camiones usados en los campos petroliferos ha resultado en considerables reducciones en el tiempo requerido para transportar e instalar los aparejos*

# Progress in Exploration, Drilling and Production

DESPITE a lack of new methods of exploration, the allied sciences of geology and exploration geophysics have made substantial progress during the past year. In fact, the absence of newly found methods appears to have given exploration departments an opportunity to correlate known techniques with excellent results. In the past it has often been felt that a new exploration method supplants some other type of activity with the result that fashions have been developed, then overdeveloped and misapplied and possibly discarded. With more detailed study it has come to be realized that any method which



*A new type high-pressure Christmas tree in a California field.*

*Un nuevo tipo de christmas tree de alta presión en un campo de California.*

APESAR de la falta de nuevos métodos de exploración, las ciencias aliadas de la geología y geofísica explorativa han realizado notables progresos durante el año pasado. En realidad, la ausencia de métodos de reciente descubrimiento parece que ha dado a los departamentos de exploración la oportunidad de correlacionar las técnicas establecidas con excelentes resultados. En el pasado, se ha visto, a menudo, que un nuevo método de exploración ha suplantado a otro tipo de actividad, con el resultado de que se desarrollan ciertos procedimientos, los cuales experimentan después un desarrollo excesivo, aplicándose erróneamente y quedando, por fin, descartados. Mediante un estudio más detenido y detallado, se ha llegado a comprender que cualquier método que se haya usado en el pasado para descubrir nuevos yacimientos, podrá aplicarse todavía, y a menudo, con mayor efectividad, debido a la confirmación derivada de los procedimientos técnicos recientemente descubiertos.

## Geología de superficie

Desde hace años hemos venido leyendo declaraciones al efecto de que se han descubierto estructuras ya conocidas. Por esta razón, ha existido cierta tendencia a descontar el valor de la geología de superficie. Los desarrollos de estos últimos pocos años han indicado que hay todavía muchas estructuras conocidas que no se han perforado hasta la fecha, y en ciertas regiones, la geología de superficie resulta más frotífera en descubrir yacimientos de petróleo, que los métodos geofísicos más altamente perfeccionados. Estos es particularmente cierto en regiones caracterizados por capas rocosas. En la región del este de los Estados Unidos de América, los trabajos de exploración, en busca de gas natural, valiéndose de los métodos de geología de superficie, han dado mejores resultados que todos los otros procedimientos, y grandes estructuras, que han sido conocidas desde hace muchos años, se están ahora perforando con mucho éxito. La geología de superficie está resultando efectiva en la región de los Montes Roca losos, en California y otras zonas productivas.

Posiblemente los desarrollos más importantes en geología de superficie resultan del entendimiento de que no se trata de la sencilla labor de andar unos pocos pasos y estudiar algunas pocas muestras. Para sacar provecho de la geología de superficie se requiere el conocimiento del hecho de que un hombre en el suelo puede ver relativamente muy poco de la región que está atravesando y que las graduaciones en formaciones pueden ser tan graduales, que se requiere una vista en grande escala de toda la región para la correcta delineación. Esta vista la provee el mapa levantado con la ayuda de un avión, el cual de al geólogo ideas del fenómeno que se busca o se encuentra, permitiéndole concentrar su trabajo en las regiones de mayor importancia. La fotografía tomada desde el avión no siempre deberá considerarse como un medio de ahorrar tiempo. Con frecuencia podrá presentar tantos datos que el trabajo del geólogo se ensancha grandemente, hasta el punto de que tendrá que dedicar más tiempo a cubrir ciertos detalles, que si no se valiera de la fotogrametría. La mayor eficacia de su trabajo más que compensa el costo adicional de la exploración.

Existe también una creciente apreciación del valor de la geología de superficie que podrá considerarse como una aplicación indirecta de la

has been used in the past to discover new fields can still be applied, often more effectively because of the confirmation provided by a recently discovered technique.

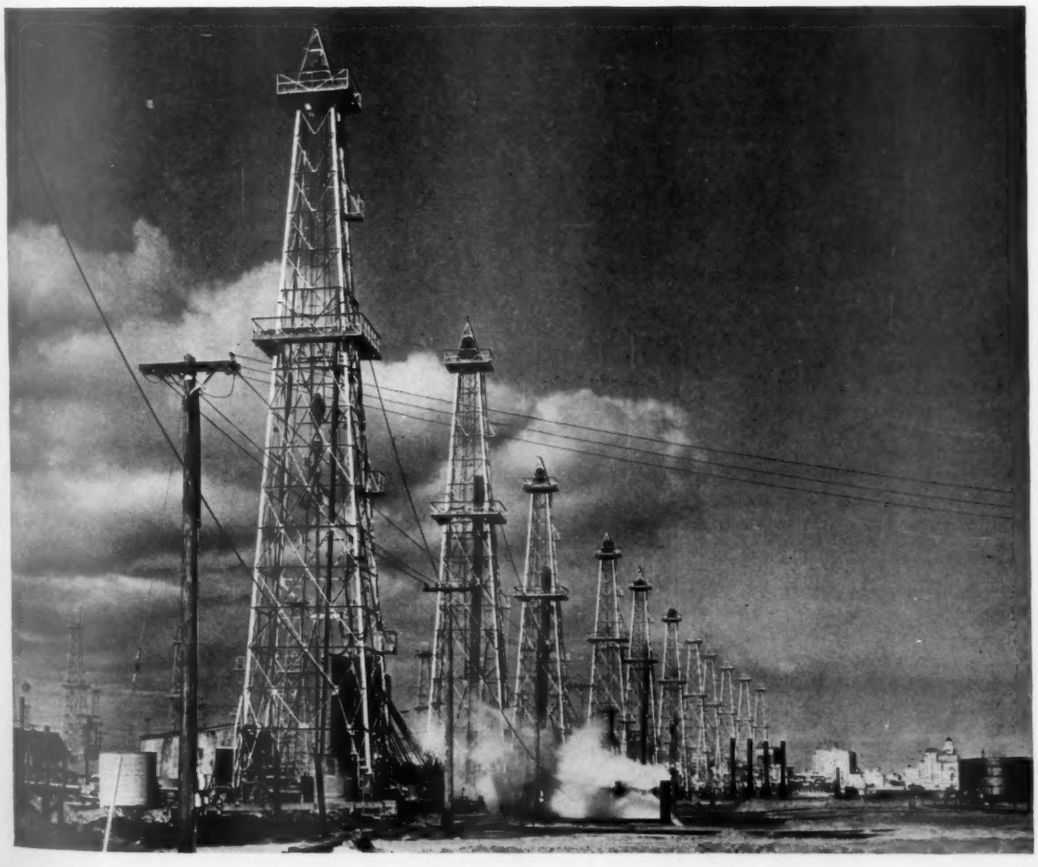
### Surface Geology

For many years statements have appeared that the known structures have been found. There has been a tendency to discount the value of surface geology as a result. Developments during the past few years have indicated that there are many known structures still undrilled and in some areas surface geology is more successful in finding oil than more highly developed geophysical methods. This is particularly true in areas underlain by hard rock which has undergone relatively sharp folding. In the eastern part of the United States, prospecting for Devonian gas based on surface geological methods has proved more successful than any other method and strong structures

*Current for a rotary drilling rig is generated by the assemblies shown above. The plant shown was barge-mounted for offshore drilling but similar plants have been used for land operations. Eight motors and generators are used instead of the conventional two or three*

*La corriente para un aparejo rotativo de perforación se genera por los grupos mostrados arriba. La instalación mostrada está dispuesta en barca para perforación cerca de la costa, pero se han empleado instalaciones similares para trabajos terrestres. Se emplean ocho motores y generadores, en lugar de los corrientes dos o tres*

# Progreso en Exploracion, Perforacion y Produccion



*An example of California development practices. The six wells shown in the foreground are drilling in the Wilmington field. The five on the far end of the line have been completed and are flowing, each from two zones*

*Un ejemplo del desarrollo de prácticas en California. Los seis pozos mostrados al frente se están perforando en el campo de Wilmington. Los cinco en el extremo alejado de la línea se han completado y están emanando, cada uno de dos zonas*

ciencia. La identificación de las formaciones encontradas en los pozos por medio de métodos petrográficos, paleontológicos, geofísicos y geoquímicos, ha resultado en confusión, debido a la falta de correlación entre los varios métodos. Esta falta de uniformidad se debe a las variaciones litológicas de las rocas, variaciones faunales en que los mismos fósiles podrán tener una considerable extensión vertical a causa de la duplicación de medio ambiente a través de prolongados períodos de tiempo, variaciones en el caracter de los sedimentos en una sola capa, debido a los movimientos, solución o precipitación de substancias quimicamente activas y un buen número de otras causas. Por supuesto, la cantidad de información sacada a la superficie, a través de agujeros pequeños, a distancias de 10 a 40 acres, en los

which have been known for many years are now being successfully drilled. Surface geology is proving effective in the Rocky Mountain area, in California, and other producing areas.

Possibly the most important developments in surface geology result from a realization that it is not a simple matter of walking a few outcrops and taking a few dips. To work out surface geology requires a knowledge of the fact that a man on the ground can see relatively little of the region he is traversing and that graduations in formations may be so gradual that a large-scale view of the whole area is necessary for their delineation. This view is provided by the airplane map, which gives the geologist clues as to the phenomena that may be sought and found and permits him to concentrate his work in areas of greatest importance. The airplane photograph need not always be regarded as a time saver, however. Frequently it may present so many facts that the work of the surface geologist is greatly expanded and he may actually spend more time covering an assignment than he would without the aid of photogrammetry. The increased efficiency of his work more than makes up for the added cost of exploration.

There is also a rapidly growing appreciation of the value of surface geology which may be considered an indirect application of the science. Indentification of formations encountered in wells by petrographic, paleontologic, geophysical or geochemical methods has resulted in confusion due to lack of correlation between the various methods. This lack of uniformity is due to lithologic variations in the rocks, faunal variations where the same fossils may have a considerable vertical range due to duplication of environment through a prolonged period of time, variations in the nature of sediments in a single bed due to movements, solution or precipitation of chemically active substances or a number of other causes. Obviously, the amount of information brought to the surface through small holes spaced from 10 to 40 acres apart in fields, or miles apart in the case of wildcats, furnishes little ground for more than speculation as to the changes involved. This speculation is rendered more valuable if the geologist possesses the knowledge gained by experience in the field working on outcrops.

The older generation of geologists had this experience before entering the oil industry but the industry is now learning that the younger generation has been trained along more highly specialized lines and still needs the fundamental training which only surface methods can give.

## Subsurface Geology

The expansion of surface methods naturally leads to a greater usefulness of subsurface geology where the knowledge gained can be applied. At the same time, the subsurface geologist has other tools which are not so directly tied in with surface methods. These may be divided roughly into three main classes—petrographic, paleontologic and indirect geological information.

*Petrographic methods.*—These include a wide range of subjects, in some of which there have been few recent changes. Correlation of formations on the basis of lithology remains the most frequently used branch of the science but careful lithologic work on samples from cored wells is being used increasingly as a basis for interpreting information gained from indirect methods of observation. This activity provides a greater degree of collaboration between the geologist and the geophysicist. The physicist and chemist have been slow at realizing the heterogeneity of geological bodies. The interpretation of measurements obtained by them is almost impossible without a knowledge of this heterogeneity. The geologist, on the other hand, has tended to rely too much on qualitative measurements with the result that he has not been able to appreciate the variations in actual measurements which the physicist has provided but cannot explain.

This has not been of so great importance so long as geophysics was limited to the finding of structures, but the refinements needed to pick up the stratigraphic traps and accampos, o millas apartes, en el caso de regiones desconocidas, suministra muy escasa base y conduce más bien a especulaciones acerca de los cambios existentes. Esta especulación resulta práctica sólo cuando el geólogo posee el debido conocimiento adquirido por experiencia en el mismo campo bajo estudio.

La antigua generación de geólogos tenía esta experiencia antes de entrar a la industria del petróleo, pero la industria está ahora viendo que la generación ha sido educada sobre un plan grandemente especializado y que necesita todavía el conocimiento fundamental que solo los métodos de geología de superficie pueden impartir.

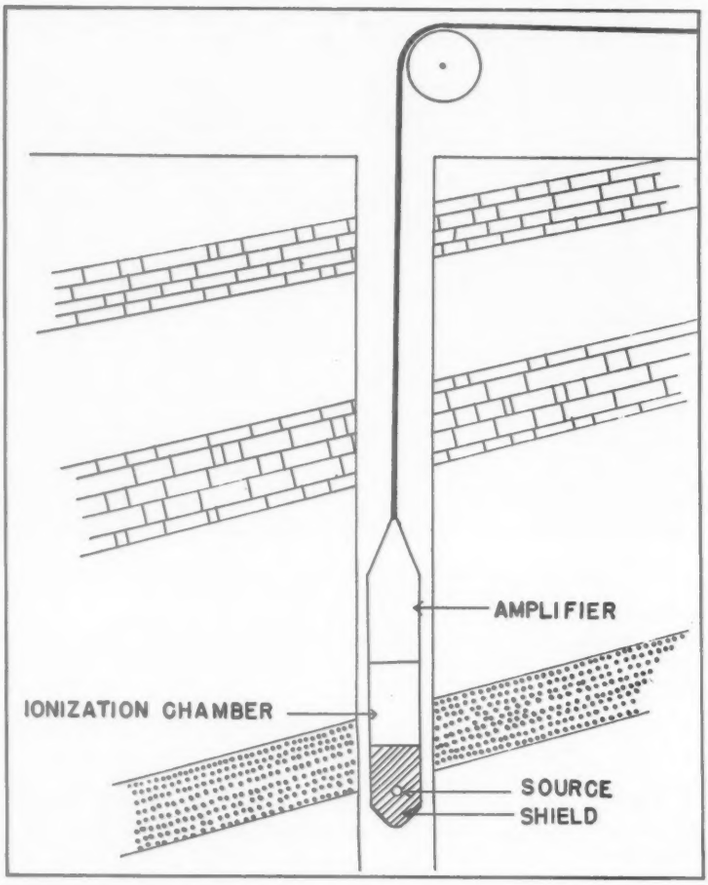



*Diagram showing the arrangement of the various components of the subsurface equipment used in neutron well logging with respect to the neutron source.*

*En este diagrama se muestra el arreglo de los varios componentes del equipo subterráneo que se usa en el registro de perforación de pozo por el método de neutrón, con respecto a la fuente de neutrón.*

## Geología subterránea

El progreso de los métodos de geología de superficie ha conducido naturalmente a sacar mayor provecho de la geología subterránea en aquellos casos en que los conocimientos adquiridos pueden aplicarse satisfactoriamente al trabajo. Al mismo tiempo, el perito en geología subterránea cuenta con otras herramientas que no están tan directamente unidas a los métodos de superficie. Estas pueden dividirse aproximadamente en tres clases principales: información petrográfica, information paleontológica e información geológica indirecta.

*Métodos petrográficos.* — Estos incluyen una gran variedad de temas, en muchos de los cuales ha ahbido muy poco cambio estos últimos tiempos. La correlación de las formaciones, sobre la base de litología, continúa siendo la ramificación más corrientemente usada de la ciencia. Continúa en aumento el trabajo litológico en muestras sacadas de los pozos, como base de interpretación de la información ganada por los métodos de observación indirectos. Esta actividad establece un mayor grado de colaboración entre el geólogo y el geofísico. El físico y el químico han sido lentos en comprender la heterogeneidad de los cuerpos geológicos. La interpretación de las medidas obtenidas por ellos es casi imposible sin un conocimiento de esta heterogeneidad. El geólogo, por su parte, ha tratado de depender demasiado de las mediciones cuantitativas, con el resultado de que no ha podido comprender o apreciar las variaciones en mediciones finales que el físico ha determinado sin poder explicarlas.

Esto no ha sido de gran importancia mientras la geofísica se ha limitado al descubrimiento de estructuras, pero los refinamientos para determinar trampas estratigráficas y acumulaciones en puntos desiguales, cuya relativa importancia esta aumentando continuamente, necesita similares refinamientos de métodos petrográficos aplicados a geología subterránea.

*Paleontología.* — La ciencia de la micropaleontología parece que ha entrado en un período de quietud, desde hace varios años. Actualmente, su aplicación en el campo de la exploración ha crecido en ciertas regiones, particularmente en la Costa del Golfo, donde los estudios paleontológicos han reemplazado, en gran medida, a los petrográficos. Un posible crecimiento de la ciencia ha sido predicho por los paleontólogos, quienes consideran que la radiolaria, conodontes, diátomos y otros microorganismos ofrecen un campo de estudio tan fértil como la foraminiferia. Es muy posible que estas formas, que actualmente pasan muy ignoradas, se encontrarán útiles en muchas regiones, incluyendo algunas en que la foraminiferia da ahora muy poca información de valor.

*Métodos indirectos.*—Bajo la designación de "métodos indirectos" se pueden incluir todas las formas de información que tratan de identificar la roca por la correlación de ciertas propiedades. Esto incluye la observación eléctrica, que mide la porosidad, permeabilidad y resistencia de las formaciones perforadas; las observaciones con rayo gama, que correlaciona las capas sobre la base de su contenido de constituyentes radioactivos; observaciones de tiempo de perforación, que correlacionan las formaciones sobre la base de su relativa dureza; observaciones con lodo, que miden cuantitativa y cualitativamente el contenido flúido de las formaciones, y otros métodos.

El uso de estos métodos de observación, en combinación con el análisis de muestras, que puede conside-

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cumulations at unconformities whose relative importance is constantly increasing, necessitate similar refinements of petrographic methods applied to subsurface geology.

*Paleontology.*—The science of micropaleontology appears to have entered upon a period of quiescence some years ago. Today its application in the field of exploration has grown in certain areas, particularly along the Gulf Coast where paleontologic tops have largely replaced tops determined by the petrographer. A possible growth of the science has been predicted by paleontologists who consider that radiolaria, conodonts, diatoms and other microorganisms offer as fertile a field for study as the foraminifera. It is highly possible that these forms which are now largely ignored will be found usable in many areas, including some in which foraminifera now give little information of value.

*Indirect methods.*—Under the term "indirect methods" may be included all of the forms of logging which attempt to identify the rock by correlating some property. This includes electric logging, which measures the porosity, permeability and resistivity of the formations traversed by the drill; gamma ray logging, which correlates strata on the basis of their content of radioactive constituents; drilling-time logging, which correlates formations on the basis of their relative hardness; mud logging, which measures qualitatively and quantitatively the fluid content of the formations, and other methods.

Use of these logging devices together with core analysis, which may be considered an expansion of quantitative petrography, is constantly increasing. As a result, there is a tendency, which is probably only temporary, to use mechanical logs rather than the older types of geological logs in working out subsurface geology. This is due in part to the greater speed of preparing a mechanical log, in part to their greater accuracy as changes are closely correlated with the depths at which they occur, but most of all to the failure of geologists to provide standard quantitative data which exclude the personal factor.

That the mechanical logs do not tell the whole story is becoming manifest and increased geological research is being conducted by many companies in order to increase the value of logging methods not only in subsurface geology but also in providing a sound engineering basis for the production of oil and gas.

## Changes in Geologic Thought

Leaders in the field of exploration frequently regard changes in point of view rather than improvement in exploration technique as of fundamental importance. The rapid rise of specific methods followed by discard in some cases or restricted use in others has demonstrated that there is no panacea for removing fears of eventual shortage of oil. Attempts to use a single exploration method universally have led to the expenditure of many millions. Thus many department heads are stressing the value of cooperation in the search for oil, cooperation between scientists working in different fields as well as in different phases of the same field. Specialization, even among geophysical companies, is rapidly becoming a thing of the past and most companies are equipped and have trained personnel to handle any sort of exploratory work that seems best suited to the area to be studied.

Along with the greater emphasis on cooperation, there is an increasing demand for more open-mindedness on the part of geologists. Where one leading geologist stresses the importance of the "speculative geologist" a prominent geophysicist replies that, in his opinion, the best team consists of an "optimistic geologist and a pessimistic geophysicist." A relatively few years ago geologists held firm views on where oil could and could not be found. They held rigid theories as to the origin, accumulation and occurrence of oil and areas which did not fit their particular yardsticks were ignored. Today these theories have been greatly modified and few men are willing to condemn areas where the surface formations are not too highly metamorphosed to contain oil or are intrusive igneous rocks unless those areas have been thoroughly tested to the basement rocks.

The more progressive organizations do not depend on the use of a single exploration technique but require condemnation by several before considering an area as nonproductive. Where only a few years ago it was a very lonely geologist who declaimed against "the seductiveness of the closed contour," so many have come to realize the importance of stratigraphic traps and other types of accumulation where closure on at least one side is not structural that these types of accumulation are not receiving nearly as much attention in the literature as they once did. The point has been proved so thoroughly that it has ceased to be worthy of mention. However, the realization of the commonness of these occurrences has done more to eradicate erroneous theories, to increase cooperation among exploration scientists and speculative thinking on the part of executives than any other single factor.

## Progress in Logging Methods

There have been few changes in logging methods during the past year except for refinements leading to greater accuracy and ease of recording readings. Generally speaking, the newer methods have been subject to greater improvements than the older more-established techniques.

Mud analysis, or logging during drilling, has become widely used.

*(Continued on Page 179)*

rarse como una extensión de la petrografía cuantitativa, está creciendo continuamente. Como resultado de esto, existe la tendencia, talvez temporaria, al uso de medios mecánicos, en lugar de los tipos geológicos que se empleaban antes para estudiar la geología subterránea. Esto se debe en parte a la mayor rapidez en la preparación de un medio mecánico, y por otro lado, a la mayor exactitud, a causa de que los cambios se correlacionan más exactamente con las profundidades en que ocurren, pero sobre todo, a la falta de los geólogos en proveer datos cuantitativos normales que excluyen el elemento personal.

De que las observaciones mecánicas no cuentan toda la historia se está haciendo cada vez más evidente, y por esta razón, un creciente estudio geológico se está haciendo por muchas compañías, para aumentar el valor de los métodos de observación en lo tocante a geología subterránea y para proveer también una base técnica racional para la producción de petróleo y gas.

## Cambios en entendimiento geológico

Los especialistas en el campo de la exploración con frecuencia consideran los cambios de punto de vista, más bien que los adelantos en técnica de exploración, como cosas de importancia fundamental. El rápido progreso de métodos específicos seguidos por el olvido, en algunos casos, o por el uso limitado, en otros, ha demostrado que no hay un remedio ascertado para ahuyentar los temores de una eventual escasez de petróleo. Los atentados al uso de un solo método universal de exploración han conducido al gasto de muchos millones. Por esta razón, muchos jefes de departamentos están acentuando el valor de la cooperación en los trabajos de exploración en busca de petróleo, cooperación entre los hombres de ciencia que trabajan en diferentes campos lo mismo que en diferentes fases del mismo campo. La especialización, hasta en las compañías geofísicas, se está convirtiendo tapidamente en una cosa del pasado, y por esta razón, casi todas las compañías cuentan ahora con equipo y personal preparado para manejar cualquier trabajo de exploración que se presente más adecuado a la región por estudiarse.

Paralela al mayor énfasis sobre cooperación se presenta una creciente demanda de mentalidad más liberal entre los mismo geólogos. Donde un prominente geólogo da énfasis a la importancia de un "geólogo especulativo," un eminente geofísico responde que, en su opinion, la mejor combinación consiste en un "geólogo optimista y un geofísico pesimista." Relativamente hace pocos años, los geólogos se mantenían firmes en su opinión acerca de donde podría encontrarse petróleo o no encontrarse. Sostenian rígidas teorías acerca del origen, acumulación y existencia de petróleo y las regiones que no quedaban dentro de sus reglas quedaban abandonadas. Hoy día, estas teorías han sufrido grandes modificaciones y pocos los profesionales que condenan regiones cuyas formaciones superficiales y subterráneas no hayan sido estudiadas y ensayadas en todos sus aspectos.

Las organizaciones más adelantadas no dependen del uso de un solo método o técnica de exploración, sino que exigen la condenación por varios métodos antes de considerar improductiva la región bajo estudio. Donde hasta hace pocos años se presentaba el caso de un solitario geólogo que aconsejaba apartarse de la "seducción del contorno cerrado," existen hoy muchos que han llegado a comprender la importancia de las trampas estratigráficas y otros tipos de acumulación en que el cierre, por lo menos en un lado, no es estructural, hasta el punto de que estos tipos de acumulación no están recibiendo el mismo grado de atención en los escritos técnicos, de que gozaban antes. El punto se ha demostrado de un modo tan completo que ha dejado de ser digno de mención. Sin embargo, el entendimiento de estas ocurrencias tan comunes, ha hecho más por eradicar las teorías erróneas, por aumentar la cooperación entre los peritos en exploración y el entendimiento especulativo entre los jefes, que todo otro factor.

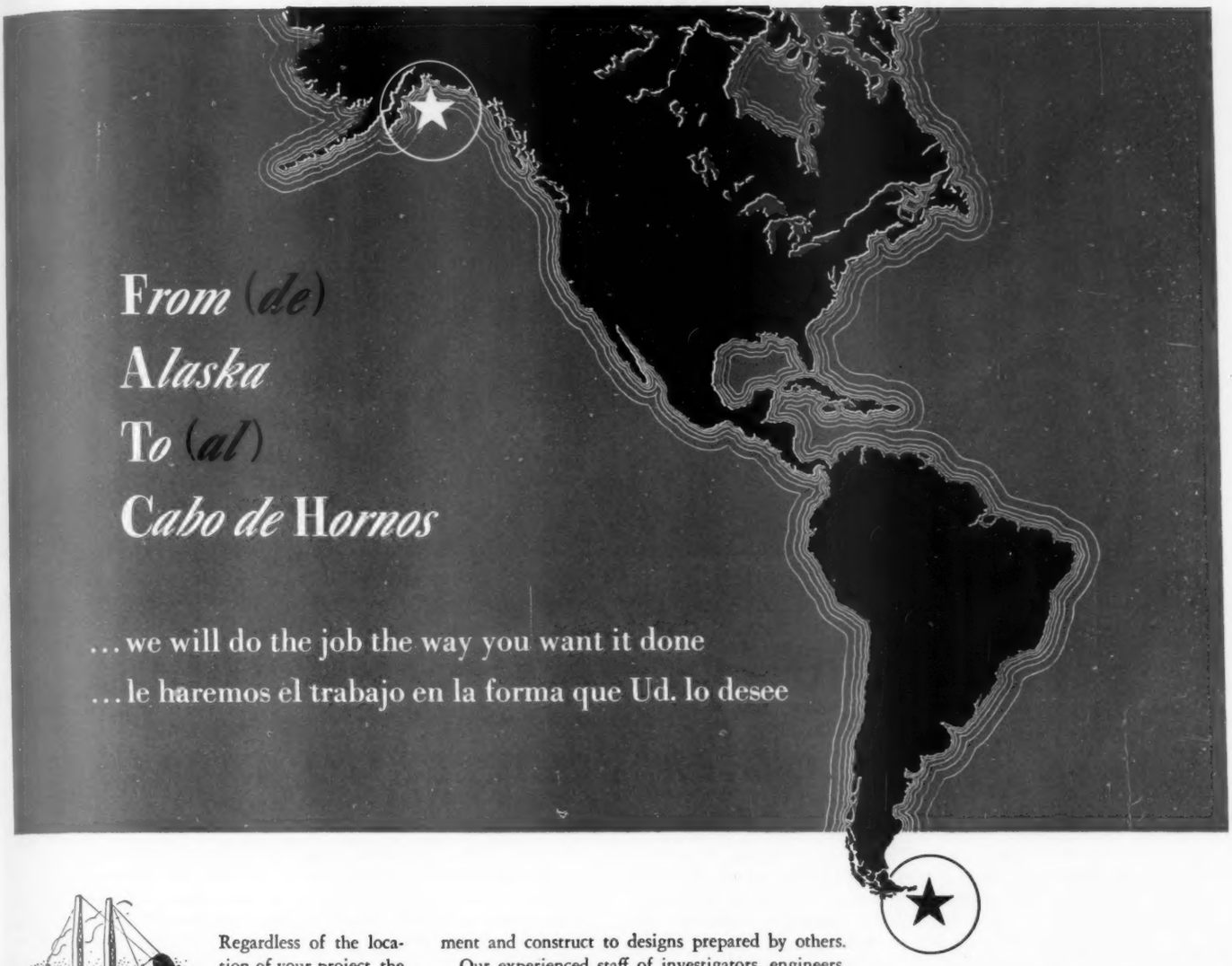
## Progreso en registro de perforación

Durante el año pasado fueron muy pocos los cambios en métodos en el reporte diario de la perforación, pero se presenciaron algunos refinamientos en beneficio de la mayor exactitud y facilidad en registrar las acusaciones. En términos generales, los métodos más recientes han sido sujetos a mayores refinamientos que los antiguos establecidos desde hace tiempo.

El análisis del lodo, durante la perforación, se usa mucho. El equipo de registro va en laboratorios montados en remolques o en camiones, que se paran al lado del pozo. En el equipo se incluye un registro de perforación, que da una acusación contínua de la rapidez de la penetración en las formaciones, lo mismo que un registro del contenido de petróleo o gas en el lodo, o salinidad. En campos conocidos, el pozo completo no se somete a registro diario, debido a que la posición de las formaciones productivas es ya conocida y todo lo que se requiere son datos necesarios para la debida terminación. Semejante registro muestra los puntos de perforación adecuados, relaciones de gas y petróleo anticipadas, el mejor punto donde instalar un obturador, efectuar dinamitación, etc.

Al tratarse de campos poco conocidos, se mantiene un registro contínuo y el reporte diario de perforación da información acerca de los puntos en que deben tomarse muestras y lleva también cuenta de las formaciones penetradas y de los li-

*(Continue en Pagina 179)*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No importa donde esté situado su proyecto, la experiencia, capacidad y flexibilidad de nuestra firma nos permiten prestar un servicio adecuado a sus necesidades. Podemos diseñar y construir una refinería completa o cualquier parte que Ud. requiera, o podemos comprar los materiales y construir con ellos siguiendo planos preparados por Ud.

Nuestro cuerpo de ingenieros, técnicos diversos, compradores y expedidores de gran experiencia nos permite hacernos cargo de su proyecto en cualquier momento. Respaldados por un enorme poder acquisitivo y ayudados por un conocimiento a fondo del sistema actual de "precedencias" adoptado por el gobierno americano, podemos apurar la entrega de sus mercancías y conseguirle una rebaja en sus pedidos.

Tenemos los medios y la organización necesaria para poder hacernos cargo de cualquier proyecto, sea cual fuere su magnitud y situación.

## 1941 B. M. P. PROJECTS

Projects authorized or completed by B.M.P. during 1941 totaled in excess of one hundred million dollars. They embraced a variety of oil refining units... distillation... cracking... solvent treating... special by-products; power and heating plants; shipyards; harbor and terminal facilities; magnesium, smokeless powder, ammonia, and chemical by-products plants.

## PROYECTOS DE LA CÍA. EN 1941

Proyectos encomendados a la Cía. y completados por ella en 1941 ascendieron a un gran total de $100,000,000. Dichos proyectos consistieron en una gran variedad de unidades de refinar petroleo... destilación... desintegración ... tratamiento por solventes... productos accesorios especiales; plantas de fuerza motríz y calefacción; astilleros; facilidades para puertos y terminales; fábricas de magnesio, pólvora sin humo, amoníaco, y productos accesorios químicos.

**BECHTEL-McCONE-PARSONS CORPORATION**

ENGINEERS & CONSTRUCTORS

*Los Angeles and San Francisco, California*

bmp

INGENIEROS Y CONSTRUCTORES

*Los Angeles y San Francisco, Calif., EE. UU. de N.A.*

# MARMON-HERRINGTON *All-Wheel-Drive* TRUCKS

Fleet of Marmon-Herrington *All-Wheel-Drive* Fords in Service of Richmond Petroleum Co., Bogota, Colombia

# Where the "GOING" is Too Tough

## . . . FOR OTHER VEHICLES TO TACKLE

In Louisiana mud, Texas sand, South American mountains, Asiatic deserts—wherever the terrain is too difficult for ordinary vehicles to travel—Marmon-Herrington *All-Wheel-Drive* trucks, commercial cars and passenger cars *are in their natural element*. They were designed and built for just such service.

Oil Company officials, scouts and geologists use Marmon-Herrington *All-Wheel-Drive* converted Fords for personnel transportation, seismographic testing, slim hole drilling and for general hauling to and from well sites. Drillers, heavy machinery haulers and pipe line contractors use Marmon-Herrington "Heavy Duty" trucks, with either four wheels or six wheels driving. These vehicles are built in a wide range of sizes up to 70,000 lb. capacities, powered with gasoline or diesel engines.

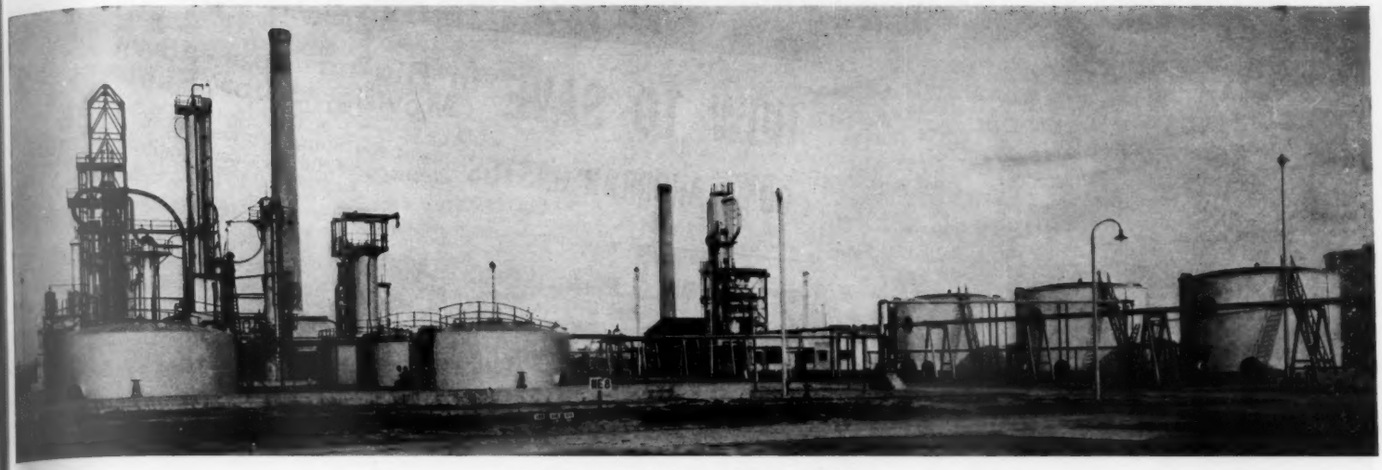
Most of our output, from a plant five times as large as it was two years ago, is going directly to military service. That is as it should be, but we are still striving to fill orders for civilian enterprises, such as the production of oil, which are essential to the maintenance of our domestic economy and the furtherance of our national defense. Literature will be mailed on request. Cable address: MARTON, Indianapolis, Indiana, U.S.A.

En el lodo de Luisiana, en la arena de Texas, en las montañas de Sudamérica, en los desiertos asiáticos—en todo lugar donde el terreno se presenta rebelde al viaje en vehículos ordinarios—los camiones, automóviles comerciales y de pasajeros Marmon-Herrington con *propulsión en todas las ruedas*, se encuentran en su *elemento natural*. Han sido proyectados y construidos para semejante servicio.

Los administradores, exploradores y geólogos de compañías petroleras usan vehículos Ford con propulsión Marmon-Herrington *en todas las ruedas* para transporte personal, ensayos sismográficos, perforación de prueba y trabajo general de acarreo en los campos petrolíferos. Los perforadores de pozos, los transportadores de maquinaria pesada y los constructores de líneas de tubería se valen de los camiones Marmon-Herrington de "trabajo pesado" con propulsión en cuatro o en seis ruedas. Estos vehículos se construyen en una amplia escala de tamaños y en capacidades hasta 70.000 libras, y llevan motores de gasolina o de tipo diésel.

La mayor parte de nuestra producción, proveniente de una fábrica que es cinco veces más grande que la de hace dos años, está dedicada al presente a los fines de la defensa nacional. Estamos, sin embargo, haciendo todo lo posible por llenar los pedidos de empresas particulares dedicadas a la producción de petróleo, producto esencial a la economía y progreso nacional. A solicitud enviaremos información completa. Dirección telegráfica: MARTON, Indianapolis, Indiana, E.U.A.

**MARMON-HERRINGTON CO., INC.** • INDIANAPOLIS, IND., U. S. A.



*TYPICAL CRACKING PLANT*
*Part of a complete petroleum refinery in South America designed and built by Foster Wheeler*

*TIPICA PLANTA DE DESINTEGRACION O CRACKING*
*Una parte de completo refinería en América del Sur proyectado y construido por Foster Wheeler*

# Refinerias Completas
# Complete Refineries

| | |
|---|---|
| Polymerization plants | Instalaciones de polimerización |
| Iso-Octane Plants | Instalaciones de iso octano |
| Cracking and Reforming units | Unidades de cracking y reformación |
| Crude Oil and Gasoline Stabilization plants | Instalaciones de estabilización de petróleo crudo y gasolina |
| Continuous Coking Process<br>Hydraulic Decoking<br>Viscosity Breaking | Procedimiento de coquificación contínuo<br>Descoquificación hidráulica<br>Alteración de viscosidad |
| Isomerization | Isomerización |
| Continuous Sweetening plants | Instalaciones de tratamiento destufador contínuo |
| Liquid butane and propane units | Unidades de butano y propano líquido |
| Solvent lube oil Extraction<br>Furfural refining | Extracción de aceite lubricante por solvente<br>Refinación furfural |

DESAROLLO
INVESTIGACION
EXPERIMENTOS
ESTUDIO DE PROCEDIMIENTOS
PROYECTOS MECANICOS
INGENIERIA
FABRICACION
CONSTRUCCION
OPERACION
MANUFACTURA DE GASOLINA DE AVIACION Y LUBRICANTES

DEVELOPMENT
RESEARCH
EXPERIMENTAL
PROCESS DESIGN
MECHANICAL DESIGN
ENGINEERING
FABRICATION
CONSTRUCTION
OPERATION
AVIATION GASOLINE and LUBRICANT PROCESSING

| | |
|---|---|
| Filtrol fractionation | Fraccionación por filtrol |
| Alkylation | Alcalización |
| Continuous acid treating of all oils | Tratamiento contínuo al ácido de todos los petróleos |
| Absorption and Compression Gas Plants | Instalaciones de absorción y compresión de gas |
| Solvent Dewaxing Plants<br>M-E-K Benzol Dewaxing | Instalaciones de desparafinación por solvente<br>Desparafinación por benzol M-E-K |
| Hydrogenation units | Unidades de hidrogenación |
| $H_2S$ Removal<br>Gas or liquid phases | Remoción del $H_2S$<br>Fases de gas o de líquido |
| Low Temperature Cracked Gasoline Rerun | Destilación secundaria de gasolina desintegrada, a baja temperatura |
| High Vacuum Lube Rerun | Destilación secundaria de lubricante a gran fuerza de vacío |
| Vacuum flash asphalt units | Unidades de asfalto al vacío |

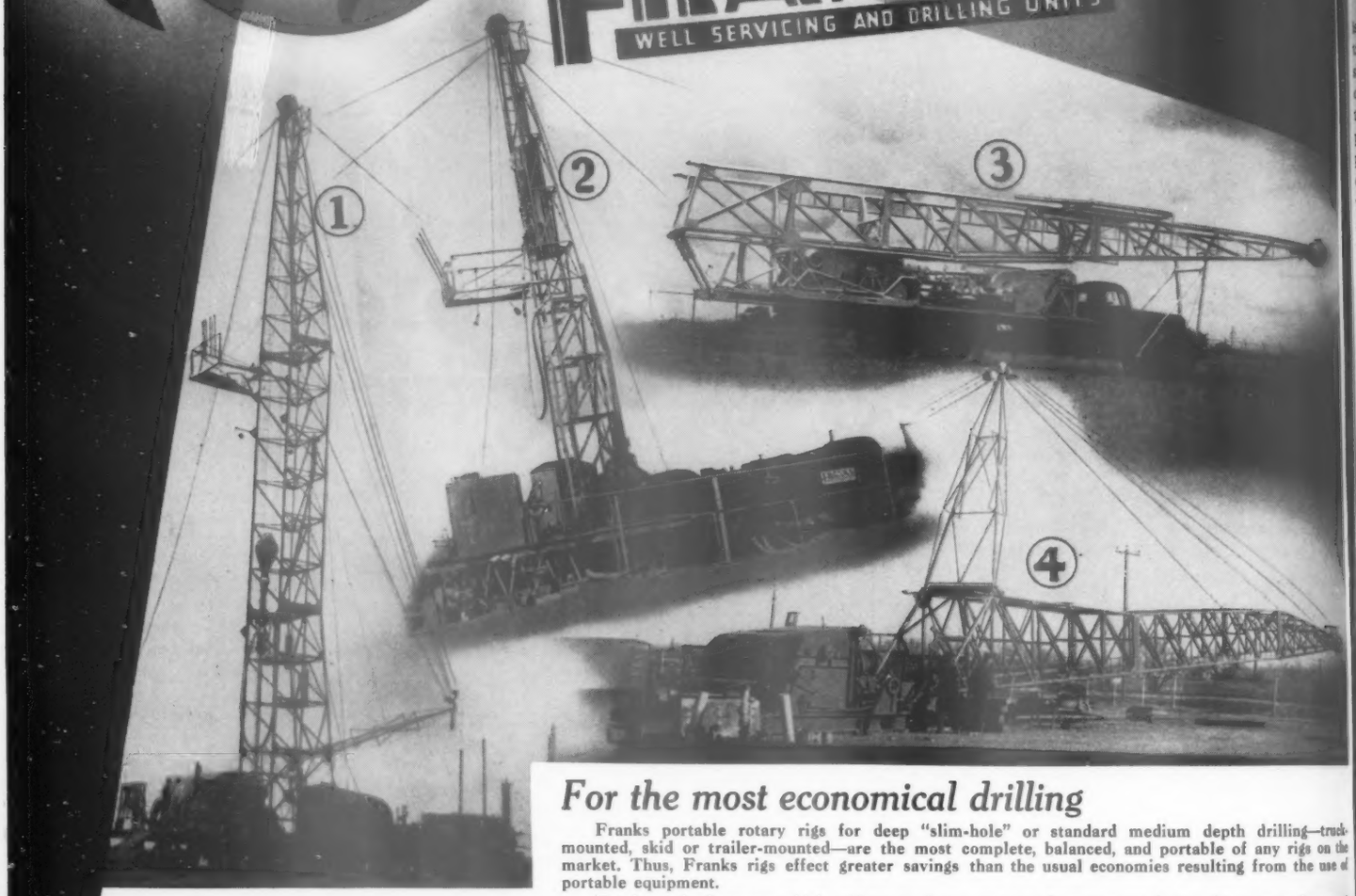
FOSTER WHEELER CORPORATION, 165 BROADWAY, NEW YORK, N. Y.

FOSTER WHEELER

# HOW TO SAVE in Rig-up Tear-down Moving, Labor, Fuel

## COMO AHORRAR GASTOS en instalación, desmontaje, transporte, labor y combustible

FRANKS MFG. CORP.
WELL SERVICING AND DRILLING UNITS




*1. Franks skid-type portable rotary drilling rig in drilling position. 2. Franks truck-mounted portable rotary drilling rig in drilling position. 3. Franks truck-type rig in over-the-road position. 4. Franks skid-type rig in position for raising the derrick.*

*1. Torre de perforación rotativa Franks, tipo portátil en patines, en posición de perforación. 2. Torre de perforación rotativa Franks, tipo portátil en camión, en posición de perforación. 3. Torre de perforación Franks, tipo portátil en camión, en posición de transporte. 4. Torre de perforación Franks, tipo en patines, en posición para su levantamiento.*

**SEE FRANKS REPRESENTATIVES**

***Cable Address:* FRANSI**

**Export Office:** A. V. Simonson, 149 Broadway, New York, U. S. A. **Texas, Gulf Coast, Arkansas and New Mexico:** R. M. White, Neil P. Anderson Bldg., Fort Worth, Texas. **Oklahoma, Kansas, Rocky Mountains:** W. R. Brown, Box 3218, Tulsa, Okla. **Illinois Basin and Michigan:** Glen L. Wigton, Box 26, Vincennes, Ind. **California:** Hillman-Kelley, Inc., 2441 Hunter Street, Los Angeles, Calif.

FRANKS MFG. CORP.
WELL SERVICING AND DRILLING UNITS

**Tulsa, Oklahoma, U. S. A.**

## *For the most economical drilling*

Franks portable rotary rigs for deep "slim-hole" or standard medium depth drilling—truck-mounted, skid or trailer-mounted—are the most complete, balanced, and portable of any rigs on the market. Thus, Franks rigs effect greater savings than the usual economies resulting from the use of portable equipment.

Franks main features, which add up to lower cost per footage, are: faster rig-up, tear-down and moving; labor and fuel savings; elimination of cost of permanent derrick; drills as fast as heavier equipment; derrick of truck unit folds over truck for moving; skid rig derrick easily moved in one, two, or three pieces; less casing cost by drilling "slim-hole."

Franks rigs and servicing units are field tested and are used by the leaders in every important oil field over the entire world.

Space doesn't permit adequate description of the Franks products. See the Composite Catalog of Drilling Equipment and Production Directories for fuller details or write for *complete* details. Compare the complete and balanced features of Franks equipment with others and you'll see why Franks has produced and sold more truck-mounted portable units than any other manufacturer and why drilling crews are proud to work on Franks rigs.

## *Para la perforación más económica*

Las torres de perforación rotativa Franks, de tipo portátil, para perforar agujeros profundos de poco diámetro o agujeros de diámetro corriente a regular profundidad, montadas en patines o en remolques, son las más completas y mejor contrapesadas de todas las de tipo portátil del mercado. Por esta razón, las torres de perforación Franks efectúan mayores ahorres de gastos, en comparación con las economías que ordinariamente se logran de los demás equipos portátiles.

Las ventajas principales de las Franks, que producen estos menores gastos por pié, son: instalación más rápida desmontaje y transporte más rápido y facíl; ahorros en labor y combustible; eliminación del gasto de un aparejo permanente; perfora con la misma rapidez de un equipo más pesado; la torre se pliega sobre el camión para su rápido transporte; la torre en patines puede transportarse facilmente en una, dos o tres partes; menos costo de revestimiento mediante la perforación de agujero angosto.

Las torres y unidades de servicio Franks han sido demostradas en la práctica y se usan por las principales empresas petroleras en todas partes del mundo.

La limitación de espacio no permite una descripción detallada de los productos Franks. Vea el Catálogo General o los Directorios de Equipo de Perforación y Producción, para mayor información, o bien pídanos directamente detalles completos. Compare todas las ventajas del equipo Franks con las de otros productos similares, y verá entonces por qué la Franks ha producido y vendido más torres portátiles de perforación que todo otro fabricante del ramo, y por qué los mismos operarios están tan satisfechos con nuestros productos.

Logs are prepared at trailer or truck laboratories set up beside the well. These include a drilling-time record giving a continuous record of rate of penetration of formations as well as a record of oil or gas content of the mud or salinity. In proven fields the whole well is not necessarily logged as the position of the pays is known and all that is required are data necessary to proper completion. Such a record shows proper perforation points, gas-oil ratios to be expected, best place to set a packer, shoot, etc.

In wildcats, a continuous record is kept and the log gives information as to the places where cores should be taken as well as a record of the formations penetrated and the fluids found. In some fields, especially where there are multiple pays of which some carry oil and others gas, mud analysis provides valuable information as to the probable yield of any individual sand which permits operators to decide whether to complete in a sand or go through it before setting pipe so as to try for deeper pays. This is of great economic importance on the flanks of gas-distillate structures where some sands may have graded into oil pays. Here the classification of the well and, therefore, its allowable production depends primarily on the gas-oil ratio and mud analysis provides a method of determining this without setting pipe and making a drill-stem test.

## Neutron Well Logging

During 1940 radioactivity or gamma ray logging was established and has found wide acceptance. Since this method does not analyze the fluid content of the rocks, its application was mostly in correlation. It has the advantage of working in cased holes as well as in open holes as the gamma rays emanating from the formations can pass through cement and casing.

Supplementing this logging method, the neutron method is being developed at the present time. Neutrons from a source which is shielded from the recording apparatus bombard the formations. A certain percentage of these are reflected back and the number depends mainly on the density of the rock but it has been found that hydrogen compounds, notably hydrocarbons, also increase the proportion of rebounds. Logs made by the radioactivity and neutron methods correlate very closely with electric logs but give more detail in certain zones where electric logs do not pick up variations. On the other hand, the resistivity curve of the electric log frequently indicates the nature of the fluid filling the pores of the rocks. In both, the presence of connate water masks the reactions for hydrocarbons which normally would be picked up by mud logging.

## Geophysical Prospecting

As in previous years, progress in exploration geophysics lies mainly in the direction of refinements of measurement or in improvements in computation or interpretation methods. The relative importance of the different methods remains about the same with reflection seismograph occupying first rank followed by gravimetric methods. The refraction seismograph is again being used in some areas such as West Texas and good results are reported. Worthy of mention are better methods for synchronizing seismograph recordings and the development of an underwater gravimeter which can be read from a boat, thus permitting geophysical exploration of lakes and shallow-water areas along the coast.

quidos encontrados. En algunos campos, especialmente donde hay formaciones productivas múltiples, ya de gas, ya de petróleo, el análisis del lodo suministra valiosa información acerca del posible rendimiento de cualquiera arena individual, lo cual permite al explotar decidir si ha de completar el pozo en una arena o atravesar esta sección antes de colocar la tubería, para llegar a yacimientos más profundos. Esto es de gran valor económico en los flancos de estructuras de destilados de gas, donde algunas arenas pueden haberse convertido en depósitos de petróleo. Aquí, la clasificación del pozo, y por lo tanto, su producción permitida, dependen principalmente de la relación de gas y petróleo, y el análisis del lodo provee un método de determinar esto sin la introducción de tubería o la realización de una prueba de vástago de perforación.

## Registro de perforación por neutrón

Durante 1940, el registro de perforación radioactivo o por rayo gama fué introducido con amplia aceptación. Como este método no analiza el contenido líquido de las rocas, su aplicación fue principalmente en la correlación. Tiene la ventaja de trabajar en agujeros revestidos, lo mismo que en agujeros sin revestir, pues los rayos gama que emanan de las formaciones puede atravesar el cemento y el revestimiento o tubería.

Para suplementar este método de registro, se está desarrollando al presente el método neutrónico. Los neutrones provenientes de una fuente que está protegida o aislada del aparato registrador, bombardean las formaciones. Un cierto porcentaje de ellos regresa y el número depende principalmente de la densidad de la roca. Se ha observado que los compuestos de carbono, principalmente los hidrocarburos, aumentan también el rebote de los neutrones. Los registros hechos por los métodos de radioactividad y neutrones se correlacionan mucho con los registros eléctricos, pero dan más detalles en ciertas zonas donde los eléctricos no acusan las variaciones. Por otra parte, la curva de resistividad del registro eléctrico indica frecuentemente el caracter del flúido contenido en los poros de las rocas. En ambos, la presencia de agua congénita disimula las reacciones de los hidrocarburos que normalmente se acusarian por el registro de lodo.

De los tres tipos principales de registros usados ahora, cada uno parece que tiene sus ventajas individuales en diferentes formaciones y zonas, lo cual es una conclusión a la cual se llegó hace tiempo en relación con los métodos de exploración geofísica.

## Exploración geofísica

Como en años anteriores, el progreso en la geofísica aplicada a la exploración se presenta principalmente en el sentido de refinamientos en medición o en mejoramientos en la computación o interpretación de los métodos. La importancia relativa de los diferentes métodos continúa casi lo mismo, con el sismógrafo de reflexión ocupando el primer puesto, y con los métodos gravimétricos en segundo término. El sismógrafo de reflexión se está usando otra vez en ciertas regiones, como el oeste de Texas, con buenos resultados. Dignos de mención son también los mejores métodos de sincronizar los registros sismográficos y el desarrollo de un gravímetro submarino, que puede leerse desde un bote, lo cual permite la exploración geofísica de lagos y regiones de poca profundidad a lo largo de la costa.

# Progress in Drilling
# Progreso en Perforacion

DRILLING activity during the first part of the year was not so great as in 1940, but due to the increasing demand for oil the pace was stepped up during the last half. However, from the very first it was evident that little effective work of a strictly experimental nature could be carried out and that for the most part drilling-organization efforts would be directed toward increasing the efficiency and the longevity of the material on hand.

There are numerous items which were developed during the past several years, but which only now are becoming widely used. As a whole, the past year has seen some interesting practices and equipment introduced and more than average improvement made in many cases. Particularly important has been the work on drilling muds and cementing practices. Also outstanding has been the continuance of the trend toward portability of drilling equipment. The reduction of hole sizes has also continued although it appears to now be at a practical minimum.

*(Continued on Page 182)*

LA actividad en perforación durante los primeros meses del año no fué tan grande como en 1940, pero debido a la creciente demanda de petróleo, se aceleró el paso durante los últimos meses. Sin embargo, desde el principio se hizo evidente que muy poco trabajo efectivo de caracter estrictamente experimental podía llevarse a cabo, y que casi todos los esfuerzos de las compañías perforadoras se concentrarían en aumentar el rendimiento y la duración del material a mano.

Hay varias cosas que fueron desarrolladas estos últimos años y que sólo ahora están teniendo amplia aplicación. En términos generales, el año pasado ha presenciado la introducción de ciertas interesantes prácticas y equipos y los progresos, en muchos casos, han sido satisfactorios. De particular importancia ha sido el trabajo de perforación con lodo y prácticas de cementación. También ha sido sobresaliente la continuación de la tendencia hacia el equipo de perforación portátil. La reducción del diámetro de los agujeros ha continuado también y parece que se ha llegado a un mínimo

*(Continue en Pagina 182)*

# here's a Flupaco Oil Well Pump for every type of production need!

## FLUPACO "GROOVE-SEALS"

Oil men who have put them to work on the toughest jobs will tell you there isn't a better pump value to be found than the economically-priced Flupaco "Groove Seals." For longer production with *less* maintenance . . . for fewer replacement needs (a vital point today) . . . for modern pump design with features never before obtainable . . . "Groove Seals" are today's best buy for any well capable of using an insert (rod) type Pump. "Groove Seals" are available with the new Hardened and Honed one-piece alloy steel barrels—designed and built by Flupaco to give you better pumping at lower cost.

### Meet Many Well Conditions

Flupaco "Groove Seals" are made to meet a wide variety of well conditions. They are not only supplied in various sizes and metals for the mechanical conditions, the well depth and the type of fluid to be pumped, but in both top and bottom anchoring and in traveling barrel and traveling plunger types for every installation problem. All "Groove Seals" have the largest cross-sectional displacement practical in insert construction.

**THE VOLUME PRODUCER** is simple in design, fast to install, and easily understood by all well crews. It is especially valuable for large volumes and deep pumping, for sand conditions, for corrosion and for light and heavy oils.

**THE PRODUCER** is recommended for medium volumes and depths, and for economical marginal service even under severe conditions. Insert construction permits fast installation and removal. Is especially valuable where troublesome sand conditions exist.

**THE PETROL A** is simply designed and low priced to meet the requirements of stripper well service and shallow production. Is made for 2" tubing, but can be readily adapted to 2½" tubing when required.

## FLUID PACKED PUMPS

The exclusive design of the Fluid Packed Pump—in which the fluid being pumped acts as a permanent packing—has been proven on thousands of installations all over the world. These simple and highly efficient pumps are made in the types and sizes to fit a wide range of production problems . . .

**THE POSITIVE PULL TYPE** is recommended for general pumping conditions wherever the insert feature is desired. Entire assembly goes in and comes out on the rods, assuring positive pulling action.

**THE REMOVABLE TYPE** has a manually-operated hook-on device that enables the operator to pull the standing valve and seat or leave them in place, as desired, when pulling the traveling tubes.

**THE MARGINAL TYPE** has all the operating features of the Positive Pull Type, together with extremely low maintenance cost. Particularly recommended for marginal or low-volume service in which serious sand conditions prevail.

## "FLU-RING" AND "FLU-CUP" PUMPS

While these new Flupaco Pumps are not designed to replace metal-to-metal types in difficult fields, they are lower in original cost and upkeep, and should be considered for the wide range of conditions under which they will operate satisfactorily. All machined parts are of the same high quality used in the more expensive pumps—centerless ground, filed, gauged and treated against rust caused by handling. Both Pumps use the new HARDENED AND POLISHED BARRELS for precision performance.

**THE "FLU-RING" PUMP** has plunger of special composition rings, cut and ground to precision measurements and spaced by metal spacer rings which shoulder together for rigidity. Highly efficient where water volume is a problem.

**THE "FLU-CUP" PUMP** is similar in construction to the "Flu-Ring," but uses cup type rings which expand under fluid pressure, sealing against the wall of the pump barrel.

**"IMPROVED INSERT" PUMP**—Latest addition to the Flupaco Pump Line—and the most outstanding development in recent years—the "Improved Insert" Pump has no joints to leak or liners to break, eliminating trouble often encountered with many-parted rod sectional pumps. Accurate alignment and free plunger stroking are assured with the one-piece hardened alloy steel barrel which can be repeatedly rehoned for long wearing life. This is the answer to the popular demand for a hard metal pump.

Fluid Packed Pump Catalog No. 9—sent on request—contains descriptions, illustrations and ordering data covering the complete line of Flupaco Pumps for every production need. Write for your copy of this valuable catalog today!

## BOMBAS FLUPACO "GROOVE SEALS"

Los petroleros que las han puesto, a trabajar en las obras más difíciles le dirán que no hay un valor intrínseco más grande que el que se encuentra en las bombas de precio económico Flupaco "Groove Seals". Para producción *más continua* con *menos* gastos de conservación . . . para menor necesidad de repuestos (un punto capital hoy día) . . . para *moderno* tipo de bomba con rasgos nunca antes vistos . . . las "Groove Seals" son en la actualidad lo mejor que Vd. puede comprar para cualquier pozo capaz de utilizar una bomba de tipo de inserción (de varilla). Las bombas "Groove Seals" se ofrecen con los nuevos cilindros de aleación de acero cementados y pulidos—proyectados y construidos por Flupaco para dar a Vd. mejor servicio de bomba a menor costo.

### Satisface muchas condiciones de pozo

Las Flupaco "Groove Seals" se fabrican para satisfacer una gran variedad de condiciones de pozo. No sólo se suministran en varios tamaños y metales para las condiciones mecánicas, la profundidad del pozo y el tipo de flúido por extraerse, sino también en ambos tipos de anclaje superior e inferior y en tipos de *cilindro* de movimiento y *émbolo* de movimiento para todo problema de instalación. Todas las "Groove Seals" tienen el más grande desplazamiento transversal práctico en el tipo de construción de inserción.

### BOMBAS FLUID PACKED

El tipo exclusivo de la bomba Fluid Packed—en el cual el flúido que pasa actúa como una empaquetadura permanente—ha sido demostrado en millares de instalaciones en todas partes del mundo. Estas sencillas y efectivas bombas se hacen en todos los tamaños y tipos que se requieren para adaptarse a una gran escala de problemas de producción.

### BOMBA DE "INSERCION PERFECCIONADA"

La más reciente adición al surtido de bombas Flupaco—y el desarrollo más sobresaliente en estos últimos años—es la bomba de "inserción perfeccionada", la cual no tiene uniones o juntas sujetas a escapas o forros expuestos a romperse, con lo cual se suprime la molestia que a menudo se presenta con las bombas con muchas secciones de varillas. La alineación correcta y el movimiento libre del émbolo se aseguran con el cilindro enterizo de aleación de acero cementada, el cual puede alisarse repetidamente para prolongar su duración. Esta es la respuesta a la popular demanda de una bomba de metal duro.

### BOMBAS "FLU-RING" Y "FLU-CUP"

Aunque estas nuevas bombas Flupaco no están proyectadas para reemplazar a los tipos de metal contra metal, en los campos de difícil trabajo, son más económicas en precio original y gastos de conservación, y dignas de consideración en vista de la amplia escala de condiciones bajo las cuales funcionan de una manera muy satisfactoria. Todas las piezas labradas a máquina son de la misma alta calidad que se usa en las bombas más caras—amoladura sin centro, limadas, verificadas y probadas contra el enmohecimiento causado por el manejo. Ambas bombas usan los nuevos CILINDROS CEMENTADOS Y BRUÑIDOS para precisión en funcionamiento.

El catálogo No. 9 de bombas Fluid Packed se enviará al interesado que lo pida. Contiene descripciones completa, ilustraciones e instrucciones para hacer pedidos, y abarca el surtido completo de bombas Flupaco para todo requisito de producción. Pida en seguida ejemplar de este valioso catálogo.

# EL SIMBOLO DE CALIDAD CONOCIDO EN TODO EL MUNDO

30 CHURCH STREET

NEW YORK
U. S. A.

# THE SYMBOL OF QUALITY KNOWN THROUGHOUT THE WORLD

## Portable Rigs

Success of portable rigs has been partly owing to the manufacturers who have spent much time in developing this equipment and to the attempt of drilling organizations to reduce operating costs. One of the most important features has been the derrick. Most crews object to a mast which will allow only single lengths of drill pipe to be pulled. There are now portable derricks 84, 92 and 96-ft. available which can be used to pull double sections of drill pipe and it is understood that one capable of handling thribbles is soon to be introduced.

Methods used to raise these derricks vary widely. Hydraulic power, screws or gin poles and lines are most commonly employed. Mostly these derricks have their bases attached to the frame of a truck or skid and this portion stays in place while moving. When it is desired to raise the derrick, the upper sections are bolted to the base and raised as a unit. When moving from location to location within a field, it is not necessary to take the derrick apart, but it is simply laid down over the truck or skid and a trailer used to support the crown-block end. When moving over public highways, road regulations make it necessary to take the taller derricks apart in several sections.

There are a wide variety of these rigs coming on the market. Some rigs designed for drilling to 7,500 ft. are all mounted on a single truck. Other rigs, many of which are designed for only 4,500 ft. have only the draw works and the internal-combustion engines on the truck and have a power pump driven by an internal-combustion engine on a separate skid. There are also skid-type rigs having all of the equipment mounted on a single frame which also serves as the base for the portable derrick. Many of these rigs are being equipped with special drives for the transmission of power without shock. Hydraulic drives, torque converters and hydropositive drives are included.

## Special Equipment for Larger Rigs

One company has mounted a complete mechanical rotary rig in three units with each having its own set of track-laying wheels. The 87-ft. derrick is mounted on a special base 18 by 18 ft. which in addition to the track-laying wheels also has a steel wagon tongue. The derrick corners are split so they can fold while moving. The hoist stays in position on the derrick. Engines and pumps form another unit and the third unit is a 16 by 40-ft. platform used as a pipe rack while drilling and as a flat car while moving.

Just what the ultimate extent in portability will be cannot now be foreseen. Where large rigs are being used to drill wells to beyond 13,000 ft. attempts are being made to move them in an almost completely assembled unit. Derricks are moved in one case on track-laying wheels. Slush pumps have been manifolded and mounted on a single skid. In some cases even two boilers have been mounted and moved as a unit. Instead of using pits for mud, on deep wells, tanks are becoming almost standard equipment with the vibrating screens and shale shakers mounted on top of them.

## Improved Cementing

The cementing of oil wells has been common practice for a number of years but the practices have not been entirely satisfactory. This has led to considerable research on the subject. There are now available cements specially designed for almost any task. This includes slow-setting, fast-setting, sulfate-resisting and acid-soluble cements. This latter is a new product which has only recently come into use. In cementing for either gas-oil or gas-water control, this cement can be pumped into the formation and then the portion opposite and in the oil-producing zone removed with acid. It has been successfully used in a number of instances.

Another innovation has been the bulk delivery of cement to the well when casing is being set. The cement is hauled in large covered trucks and trailers which are equipped with screw feeds. This allows the cement to be fed into the hopper and a more even water-cement ratio maintained throughout the operation.

More attention is being paid to the bond between the cement and the formation with particular attention devoted to removal of the mud sheath and to centering the casing in the hole. Even shallow strings of pipe are being equipped in many cases with centralizers. In addition there is the formation scratcher, consisting of a number of stiff wires with upward projecting prongs fastened circumferentially on a collar which slips over the casing. When the pipe is raised, the wires engage the formation and remove the mud sheath.

The most vital spot in cementing pipe is the area immediately around the casing shoe. A tendency to poor bonding at the casing shoe is being corrected through the wider use of the whirler type of floats which throw the slurry out and against the formation in a spiraling action. The face of the formation is thereby scoured and a better bond results.

One company which last year introduced the rotation of casing while cementing in its operations is continuing the practice and is satisfied with the results obtained. A small amount of radioactive material is included in the portion of the cement first pumped into the well and the height to which the cement rises behind the casing is determined by running a gamma ray detector. Another company has a different method of accomplishing the scouring of the formation which consists of alternately raising and lowering the casing while the cement is being

práctico en este sentido.

## Equipos de perforación portátiles

El éxito del equipo de perforación portátil se debe por una parte a los fabricantes que han dedicado mucho tiempo a su desarrollo y por la otra, al afán de las compañías perforadoras por reducir sus gastos de explotación. Uno de los rasgos más importantes ha sido la torre. Casi todas las cuadrillas de operarios tienen objeción a un aguilón o mástil que permite el manejo de sólo una longitud de tubo de perforación. Hay ahora equipos de perforación portátiles de 84,92 y 96 piés, que pueden usarse para manejar secciones dobles de tubería de perforación, y se dice que un modelo que podrá manejar tres secciones de tubería está por introducirse dentro de poco a la industria.

Los métodos que se usan para accionar estas torres o equipos de perforación varian mucho. Los más comunmente empleados son la fuerza hidráulica, postes y cables. Por lo general, estas torres tienen sus bases unidas al bastidor de un camión o de un patín, y esta porción queda en su sitio durante el movimiento. Cuando se desea levantar la torre, las partes superiores se sujetan por pernos en la base y todo se levanta como un grupo. Al ir de un punto al otro, dentro de un campo, no es necesario desarmar la torre, sino que sencillamente se tiende sobre el camión o patín y sobre un remolque usado para soportar el extremo del caballete portapolea. Al pasar por caminos públicos, los reglamentos camineros hacen obligatorio desarmar las torres más grandes en varias secciones.

Una gran variedad de estas torres de perforación se ha introducido al mercado estos últimos tiempos. Algunas de ellas, proyectadas para perforar hasta 7.500 piés, van montadas en un solo camión. Otras torres, incluyendo las proyectadas para perforar hasta 4.500 piés, tienen sólo el aparejo de maniobras y los motores de explosión interna montados en el camión, llevando el motor de la bomba instalado en un patín separado. Hay también otros equipos de tipo de patín, en que todo el equipo va instalado en un solo bastidor, el cual sirve también de base a la torre portátil. Muchas de estas torres se están equipando con propulsiones especiales para la transmisión de fuerza sin choque. Se incluyen propulsiones hidráulicas, convertidores de esfuerzo de rotación y propulsiones hidráulicas positivas.

## Equipo especial para torres mas grandes

Una compañía ha montado una torre o aparejo giratorio mecánico completo en tres grupos, cada uno con su propio juego de carriles. La torre de 87 piés va montada en una base especial de 18 x 18 piés, la cual, además de sus ruedas de carriles, tiene una lanza de acero de vagón. Las esquinas de la torre están divididas de modo que pueden plegarse durante el transporte. El malacate queda en posición en la torre. Los motores y las bombas forman otro grupo y el tercer grupo está representado por una plataforma de 16 x 40 piés, que se usa como soporte de tubería durante la perforación y como vagón plano durante el transporte.

Hasta que punto llegará finalmente la portabilidad, no se puede predecir por el momento. Donde se emplean torres para perforar pozos a más de 13.000 piés de profundidad, se está tratando de transportarlas en forma armada casi por completo. Las torres, en un caso, se transportan en carriles. Las bombas de lodo con sus conexiones se montan en un solo patín. En algunos casos, hasta dos calderas se han instalado y movido en un solo grupo. En lugar de usar fosos para lodo, en los pozos profundos, los tanque se están haciendo ahora casi equipo normal, con los coladores o cribas de vibración y agitadores de esquisto montados encima de ellos.

## Cementación mejorada

La cementación de los pozos ha sido práctica común desde hace años, pero los métodos no han sido completamente satisfactorios. Esto ha conducido a considerable estudio de la materia. Hay ahora cementos especialmente proyectados para casi toda condición que se presente. Entre ellos se incluyen los cementos de lento endurecimiento, los de rápido endurecimiento, los resistentes al sulfato y los solubles en ácido. Este último es un nuevo producto, que acaba de introducirse al use prático. Al cementar para el control de gas y petróleo o gas y agua, este cemento puede inyectarse en la formación y luego quitarse con ácido. Ha dado buenos resultados en varios casos.

Otra innovación ha sido la entrega en gran cantidad de cemento al pozo cuando se está revestiendo. El cemento se transporta en grandes camiones y remolques provistos de alimentadores de tornillo. Esto permite alimentar el cemento a la tolva, regulándose mejor la proporción de cemento y agua durante todo el trabajo.

Se está prestando mayor atención a la unión entre el cemento y la formación, dándose particular estudio a la remoción del lodo y centración del revestimiento en el agujero. Hasta la tubería delhada se está equipando, en muchos casos, con centralizadores. Existe también el raspador de formación, el cual consiste en un número de alambres tiesos con puntas proyectadas hacia arriba, que se engutan circunferencialmente en un collar, el cual, por su parte, se corre por el revestimiento o entubamiento. Cuando se levanta la tubería, los alambres pasan raspando la formación y quitan la capa de lodo.

El punto más importante en la cementación de tubería es la zona inmediatamente alrededor de la zapata del revestimiento. La tendencia a vaciar ligazón en la zapata del re-

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# PIPE COATING

*for*

# PERMANENT PIPE PROTECTION

## PROTECCION PERMANENTE DE TUBO

El revestimiento SOMASTIC para tubería es una gruesa capa protectiva de material de asfalto que se aplica a la tubería de acero. Debido a que la demostrado su facultad para proteger la tubería permanentemente contra la corrosión en el suelo, su utilización es ahora cosa normal entre los dueños de líneas de tubería.

El revestimiento o capa consiste en agregados graduados, polvo de pieza caliza, asfalto y asbesto. El procedimiento consiste en aplicar al tubo desnudo partículas de acero, imprimación y la capa de SOMASTIC. Las juntas superpuestas aplicadas bajo presión, hacen que esta protección sin costura se extienda sin interrupción en la línea de tubería.

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Más de 1.000 millas de tubería se han protegido con el revestimiento SOMASTIC en 1941.

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SOMASTIC Pipe Coating is a thick asphalt-mastic protective coating applied to steel pipe lines. Because it has proved its ability to protect pipe permanently against damage from soil corrosion, its use is now standard with many pipe line owners.

The coating consists of graded aggregate, limestone dust, asphalt and asbestos. The process consists of shotblasting bare pipe with steel grit, priming, and applying SOMASTIC Pipe Coating. Overlapping field joints applied under pressure make this thick seamless protection continuous along the pipe line.

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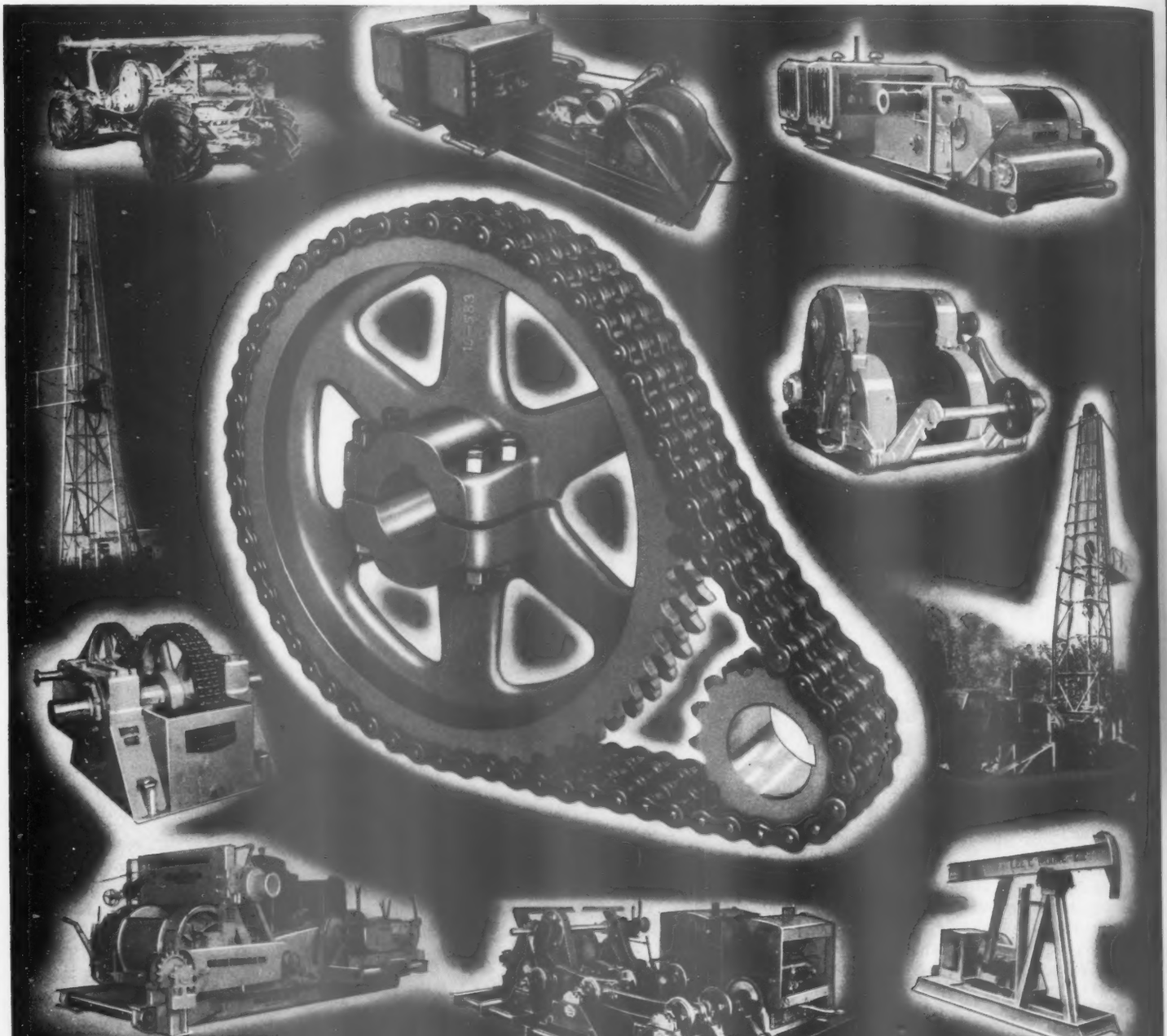


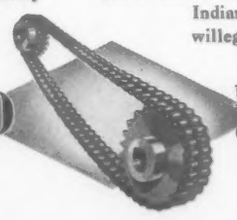
# Wherever There Is Oil Production DIAMOND Roller Chains Are At Work

Through long continuous contact with field operations and close cooperation with the designers and builders of drilling and production equipment, DIAMOND pioneered in the development of those qualities in roller chains that have contributed greatly to the successful performance of today's high speed oil field machinery. As a result of this long experience you will find that the biggest percentage of roller chain drives on drilling, pumping and servicing equipment is DIAMOND.

You can rest assured that the DIAMOND Chains on the equipment you buy have been engineered expressly for the job —and are good evidence of sound engineering and quality of the entire rig. DIAMOND CHAIN & MFG. CO., 475 Kentucky Ave., Indianapolis, Indiana. *Tulsa Office:* 2238 Terwilleger Blvd.

Gracias a contínuo y largo contacto con las operaciones de campo y cooperación íntima con los ingenieros y fabricantes de equipo de perforación y producción, la DIAMOND ha sido una de las primeras en perfeccionar esas propiedades de las cadenas de rodillos que han contribuido en gran medida al satisfactorio funcionamiento de la maquinaria de alta velocidad que se usa hoy en los campos petrolíferos. Como resultado de esta larga experiencia, verá que el porcentaje más grande de propulsiones o transmisiones por cadenas de rodillos en los equipos de perforación, de bomba y de reparación, está representado por las DIAMOND.

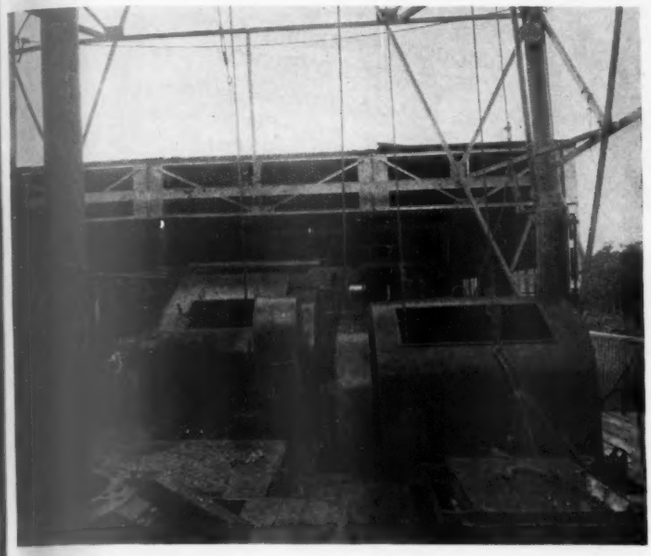
Podrá Vd. estar seguro de que las cadenas DIAMOND incluidas en el equipo que Vd. compre, han sido proyectadas especialmente para el trabajo en vista— y son elocuente evidencia de la excelente construcción y calidad del equipo en que se usan. DIAMOND CHAIN & MFG. CO., 475 Kentucky Ave., Indianapolis, Indiana, E.U.A. Oficina en Tulsa, Oklahoma, E.U.A.: 2238 Terwilleger Blvd.



**DIAMOND ROLLER CHAINS**

pumped down the pipe and during the early stages of its rise around the casing. When movement of the pipe becomes sluggish, it is set at the landing point and held there throughout the remainder of the cementing operation.

Cement can now be placed behind the casing or a liner at any number of predetermined points in quick succession by a recently introduced tool. This is especially desirable in deep holes, in wells where circulation is apt to be lost while cementing, or in wells where it is desired to leave voids behind the pipe so that a producing zone may be opened. A special mandrel, designed to engage and form a seal in each of the series of cementing collars run on the casing, is used on the bottom of the drill pipe. The mandrel forces the cement out through the ports of the cementing collars.



*Wire-line coring reel is driven through regular hoist on this rig which includes an under-the-floor drive for the rotary table*

*El carrete del cable del sacanúcleos se acciona por el montacarga corriente de este aparejo, el cual incluye una transmisión inferior para la plataforma de la rotativa*

## Drilling Fluids

It has long been recognized that the main bar to deeper and more economical exploration has been the drilling fluid. During recent years many technologists have devoted full time and efforts to this subject and progress is becoming evident. The study of drilling fluids not only takes in the composition and characteristics, but also the equipment used in the circulatory system as it has been found that when rotary speeds and bit weights are increased, the rate of fluid circulation also must be advanced.

In the past it has been necessary in many cases to use two 20 by 7 by 20-in. pumps in unison while drilling on a deep hole. One company is now using a triplex 18 by 7¼ by 20-in. pump capable of delivering 640 g.p.m. at a 100-ft. piston speed. Piston rods and the over-all length of the pump have been reduced by the new valve mechanism which allows the pump to operate on a short cushion. Use of special materials has allowed the fluid capacity increase without greatly increasing the weight. Another company is using a 19 by 9¼ by 22-in. duplex pump which delivers 700 g.p.m. at a piston speed of 100 ft. per minute.

One of the most difficult mud problems, the maintenance of a low filter rate in the presence of salt, may be solved through the work done with gums (tragacanth, karaya and ghatti), kelp (Irish moss) and starch. Because of the war, all except starch are becoming increasingly difficult to obtain but the gums demonstrated a marked ability to reduce the water loss of salt-water muds.

The first field trial of gelatinized starch was applied on a mud which showed an increase in filtrate rate by salt contamination from 30 to 82 cc. in 30 minutes. The addition of 4,000 lb. of hydrolized, or gelatinized, starch resulted in a reduction of the filtrate to 22 cc. in 30 minutes and further addition brought the water loss to 15 cc. in 30 minutes.

It should be noted that raw starch will have no beneficial effects but that the starch must be boiled with caustic soda. The starch is first mixed with water, caustic soda added and the mixture heated with steam until a viscous, straw-colored mixture results. The composition should be about 89 per cent water, 10 per cent starch and 1 per cent caustic soda. When only a small amount of starch is added, the viscosity and the filtrate is increased but further additions reverse the trend.

In addition to the vibrating screens, desanders are now being employed to remove the finer particles entrained in the mud. These particles prevent the formation of an impervious sheath on the wall of the hole and rob the formation of protection from wetting, an im-

*(Continued on Page 190)*

vestimiento se está corrigiendo mediante el uso más difundido de los flotadores de tipo giratorio, los cuales arrojan hacia afuera el material proyectándolo contra la formación, con una acción en espiral. La cara de la formación queda así protegida y de aquí resulta una unión mucho mejor.

Una compañía, que el año pasado introdujo la rotación del revestimiento o entubamiento durante la cementación de sus pozos, está continuando esta práctica y está satisfecha con los resultados obtenidos. Una pequeña cantiada de material radioactivo se incluye en la porción de cemento primeramente inyectado en el pozo, y la altura a la cual se levanta el cemento detrás del revestimiento se determina bajando un detector de rayo gamma. Otra compañía sigue un método diferente que consiste en levantar y bajar alternadamente el revestimiento mientras se está inyectado el cemento y durante las primeras etapas de su levantamiento alrededor del revestimiento. Cuando el movimiento de la tubería se siente lente o tardío, se coloca entonces en el punto de soporte y se sujeta en esta posición durante el resto de la cementación.

El cemento puede ahora colocarse detras del revestimiento o de un forro en cualquier número predeterminado de puntos en rápida sucesión, mediante una herramienta recientemente introducida. Esto es muy conveniente en los agujeros profundos, en pozos en que la circulación está propensa a perderse durante la cementación, o en pozos en que conviene dejar vacíos detrás de la tubería, para facilitar después la perforación de otra zona productiva. Un mandril especial, proyectado para engancharse y formar un cierre en cada una de las series de collares de cementación metidos en el revestimiento, se usa ahora al fondo de la tubería de perforación. El mandril obliga al cemento a salir por los agujeros que hay en los collares de cementación.

## Fluidos de perforación

Desde hace tiempo se ha visto que la principal dificultad que se presenta en la perforación profunda y económica está en el líquido de perforación. Durante estos últimos años, muchos tecnólogos han dedicado mucho tiempo y esfuerzo a este punto y el progreso de sus estudios se está ahora poniendo de evidencia. El estudio de los flúidos de perforación no sólo comprende la composición y características, sino también el equipo que se usa en el sistema de circulación, y se ha visto que cuando se aumentan las velocidades de rotación y peso de las barrenas, la rapidez de la circulación del flúido ha también de avanzarse en un grado correspondiente.

En el pasado ha sido necesario, en muchos casos, usar dos bombas de 20 por 7 y 20, en grupo, para la perforación de un agujero profundo. Una compañía está usando ahora una bomba triple de 18 x 7¼ x 20 pulgadas, capaz de entregar 640 galones por minuto a una velocidad de émbolo de 100 piés. Las varillas de los émbolos y la longitud total de la bomba se han reducido gracias al nuevo mecanismo de válvulas, el cual permite que la bomba funciona de una menera más conveniente a los requisitos del trabajo. El empleo de materiales especiales ha, por su parte, permitido aumentar la capacidad de flúido manejado, sin incrementar demasiado el peso. Otra compañía está usando una bomba duple de 19 x 19¼ x 22 pulgadas, que entrega 700 galones por minuto a una velocidad de émbolo de 100 piés por minuto.

Uno de los más difíciles problemas del lodo, la mantención de un bajo régimen de filtro, en presencia de la sal, podrá resolverse por el trabajo hecho con gomas (tragacanth, karaya y ghatti) algas marinas (musgo irlandés) y almidón. A causa de la guerra, todos estos materiales, exceptuando el almidón, se están poniendo escasos y difíciles de obtener, pero las gomas han demostrado un aptitud notable para reducir la pérdida de agua en lodos de agua salada.

La primera prueba práctica del lamidón gelatinado se aplicó a un lodo que mostraba un aumento en rapidez de filtración, por contaminación de sal, de 30 a 82 cc. en 30 minutos. La adición de 4.000 libras de almidón hidrolizado o gelatinado, resultó en una reducción de filtrado a 22 cc. en 30 minutos y agregando más de este material, la pérdida de agua quedó reducida a 15 cc. en 30 minutos.

Debe observarse que el almidón crudo no tiene ningún efecto beneficioso, y que para que resulte efectivo, ha de hervirse con soda cáustica. El almidón se mezcla primero con agua, se le agrega soda cáustica y le mezcla de calienta con vapor hasta que se forme una composición viscosa de color de paja. La composión debe ser de como 89% de agua, 10% de almidón y 1% de soda cáustica. Cuando se agrega sólo una pequeña cantidad de almidón, se aumenta la viscosidad y el filtrado, pero cuando se añade más almidón, se invierte el resultado.

En adición a los coladorse o cribas de vibración, se emplean ahora desarenadores para quitar las partículas más finas que hayan en el lodo. Estas partículas impiden la formación de una capa impermeable en la pared del agujero y quita a la formación la protección contra la humedad, lo que es un rasgo muy importante al tratarse de esquistos sueltos. Se usa una bomba centrífuga accionada por motor para inyectar el lodo a alta velocidad en la cámara centrífuga, donde la arena es lanzada hacia afuera cayendo al fondo de un receptáculo cónico, donde una pequeña corriente de agu ayuda a lavarla y sacarla por un orificio.

Para la terminación de pozos se ha preparado un flúido de perforación a base de petróleo. El uso de petróleo elimina el peligro de obturar la for-

*(Continue en Pagina 190)*

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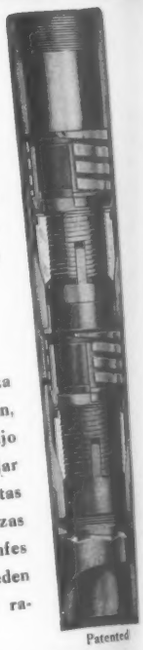
## AMERICAN RELEASING AND CIRCULATING OVERSHOT

With this Double Bowl Overshot on your derrick floor you are prepared for any unexpected fishing job. It is capable of handling either tool joint or drill pipe without changing the packer rubbers and slips. Single Bowl American Overshots can be converted into Double Bowl type, quickly and inexpensively.



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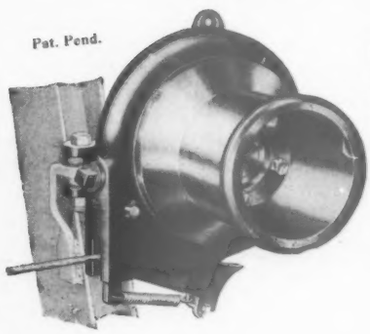
Con este enchufe "Overshot" de doble taza en el piso de su aparejo de perforación, queda Vd. preparado para cualquier trabajo de salvamento o pesca. Puede manejar uniones de espiga y cajas para herramientas o tubo de perforación, sin cambiar las piezas de caucho del tapón y cuñas. Los enchufes "Overshot" American de una taza pueden convertirse en tipo de doble taza con rapidez, facilidad y economia.

## AMERICAN SIMPLOMATIC CATHEAD

Pat. Pend.



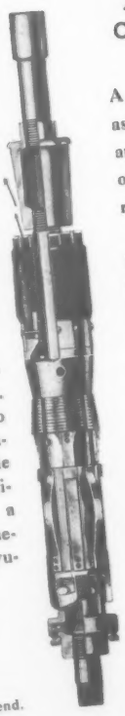
Specially designed for high speed power drawworks. Practically all shocks and jars have been eliminated by lightening the engaging member to which the jerk line is attached. Light, compact, simple. Only 7 parts.

Especialmente proyectado para tornos de extracción de fuerza mecánica de alta velocidad. Casi todos los choques y sacudidas se han suprimido por el menor peso del miembro de enganche al cual va unido el cable. Liviano, compacto y sencillo. Este cabrestante tiene sólo 7 piezas.

## AMERICAN CONTROL HEAD "TYPE A" PACKER

This packer will hold its seal under extreme pressures. Has more fluid by-pass area than any other packer. Control head feature has positive seal—no valves to leak. Small valves in bottom of packer help flow your well.

Este tapón mantiene su cierre bajo presiones extremas. Tiene más superficie de paso de flúido que todo otro tapón. El rasgo de cabeza de control tiene cierre positivo—sin válvula sujeta a escape. Las válvulas pequeñas al fondo del tapón ayudan la acción del pozo.



Pat. Pend.

## AMERICAN SUCKER ROD COUPLING AND PARAFFIN SCRAPER

A three-in-one tool that can be used as a paraffin scraper, sucker rod guide, and for barrel alignment. Made of one-piece, heat treated, forged steel to resist hardest usage. (Patented)

Una herramienta "tres en una" que puede usarse con raspador de parafina guía de varilla de bomba y para alineación de cilindro o cañón. Se hace entero rizo de acero forjado, tratado al calor, de gran resistencia al uso más severo.

## AMERICAN RELEASING AND CIRCULATING SPEAR

Used successfully everywhere for fishing for liners, casing, drill pipe and tubing. Ruggedly constructed, simple in design. Has quick, positive releasing feature. (Patented)

Se usa con éxito en todas partes para salvamento de forros, revestimiento, tubo de perforar y tubería. De firme construcción y sencillo en construcción. Tiene rasgo de soltura rápido y positivo.

## AMERICAN STANDPIPE AND MANIFOLD FITTINGS

These high pressure fittings are made from best grade of alloy steel castings. Designed to reduce frictional losses on manifold and lines. Tested to 6,000 lbs.

Estas conexiones de superior calidad se hacen de excelentes aleaciones de acero. Sirven para reducir las pérdidas por fricción o rozamiento en los tubos ramificados y tubería. Ensayadas a 6000 libras.

# AN MACHINE WORKS COMPANY PRODUCTS

# All Over the World!

## AMERICAN MANIFOLD VALVE

Here is an outstanding pump manifold valve. Locking feature on the top of the stem housing permits valve to be set at any position desired, thus doing away with creeping of the valve stem. Will withstand 5,000 lbs. pressure.

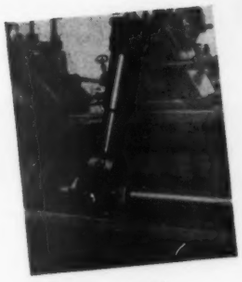
Esta es una válvula de distribuidor de bomba de sobresaliente calidad. El rasgo de cierre encima de la caja del vástago permite colocar la válvula en cualquier posición deseada, evitándose así el desplazamiento del vástago de la válvula. Puede resistir hasta 5000 libras de presión.

Pat. Pend.

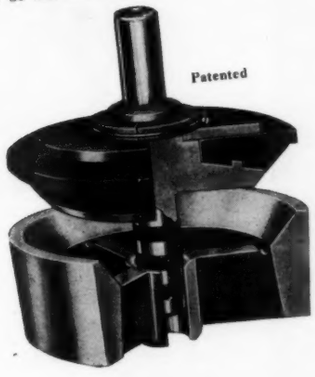
## AMERICAN ROCKER ARM

Helps pump run more smoothly and efficiently. Eliminates knocking and needless noise. Working parts enclosed to keep out dirt and slush. Easily installed.

Ayuda a la bomba a funcionar con mayor suavidad y eficacia. Elimina el golpeteo y ruido innecesario. Las piezas móviles están protegida para que no tengan contacto con el polvo y lodo. Se instala con facilidad.



Patented



Patented

## AMERICAN SLUSH PUMP VALVE AND SEAT

Built to withstand the pounding of modern power pumps. Has quick-change ring for holding insert and insert plate. Heavy-type rubber inserts that resist high pressure. Composition rings on valve stem reduce wear.

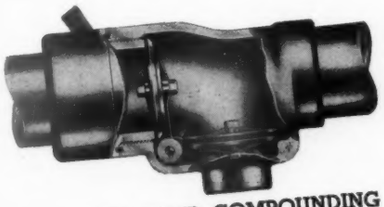
Construido para resistir el golpe de las modernas bombas mecánicas. Tiene anillo de rápido cambio para sujetar la inserción y su placa. Inserciones de caucho de trabajo pesado, resistentes a la alta presión. Los anillos de composición en el vástago de la válvula reducen el desgaste.

## AMERICAN RELEASE VALVE

Enjoys world-wide popularity because it has reduced the difficulties usually encountered with most stop cocks or release valves used on slush pumps. Simple in construction, fool-proof, rugged. Tested to 3,000 lbs.

Esta válvula de escape goza de popularidad universal, a causa de que ha reducio las dificultades que generalmente se presentan con casi todos los grifos de cierre o válvulas de escape que se usan en las bombas de lodo. Sencilla en construcción, a prueba de manos inexpertas y muy durable. Ensayada a 3000 libras.

Patented



Patent Pending

## AMERICAN SLUSH PUMP COMPOUNDING VALVE

Greatly speeds up the compounding of slush pumps, yet is so simple in design and operation it will last almost a life-time. The seat and valve can be changed with valve on pumps the same as on our American Release Valve. Tested to 5,000 lbs.

Grandemente acelera la acción de las bombas de lodo y es tan sencilla en construcción y funcionamiento que puede durar indefinidamente. El asiento y la válvula pueden cambiarse con la válvula en las bombas, lo mismo que en nuestra válvula de escape American. Ensayada a 5000 libras.

# FIRST LINE DEFENSE

## Against Trouble and Costly Delays

In oil fields all over the world, where holes are deepest and pressure highest, you'll find successful operators depending on the products shown on these pages. That's because oil men know the name AMERICAN IRON AND MACHINE WORKS COMPANY means sound engineering, quality construction, dependability and long life. Let these products be your "First line of Defense" against trouble and costly delays. For complete information, get in touch with our export office or write one of the plants or branches listed below.

En los campos petrolíferos en todo el mundo, donde los pozos tienen profundidades y presiones extremas, verá que las empresas más próperas dependen de los productos mostrados en estas páginas. Esto se debe a que los petroleros saben que el nombre AMERICAN IRON AND MACHINE WORKS COMPANY significa ingeniería correcta, construcción precisa, seguridad y prolongada duración. Deje que estos productos sean su "primera linea de defense" contra irregularidades y costosos retardos. Escriba a nuestra oficina de exportación para información completa.

AMERICAN IRON & MACHINE WORKS CO. OKLAHOMA CITY U.S.A.

# AMERICAN

IRON & MACHINE WORKS CO.

OKLAHOMA CITY, OKLAHOMA

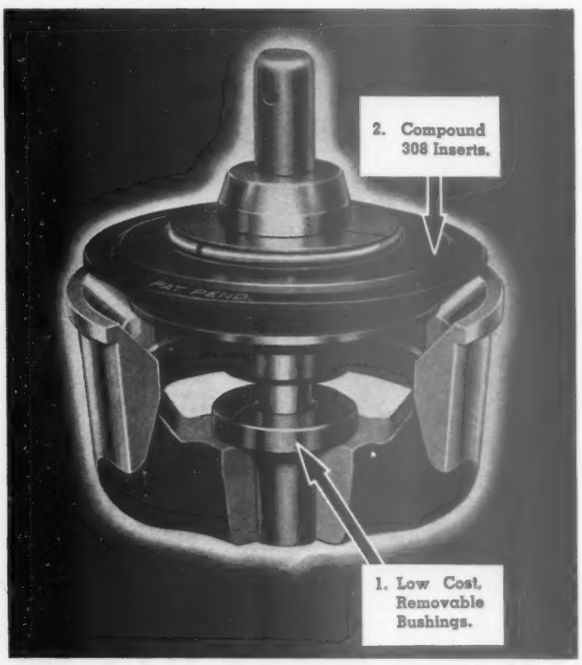
EXPORT OFFICE

420 LEXINGTON AVENUE

NEW YORK CITY

# MISSION

## . . . . speak dependable, economical performance in every oil man's language




## MISSION *Slush Pump* VALVES

*"Pull the bushing and save the seat"*

Mission Valves give long, dependable, trouble-free service because of two outstanding features:

**(1) Low cost replaceable bushings** take the wear instead of the valve seat. This feature makes it easy and economical to renew the seat for another long period of wear.

**(2) Compound-308 Inserts** last from three to five times longer—greatly reducing valve seat trouble.

*"Saque el buje y salve el asiento"*

Las válvulas Mission dan servicio largo, seguro y exento de molestia debido a dos ventajas sobresalientes:

(1) Los bujes de repuesto de bajo costo reciben el desgaste, en lugar del asiento de la válvula. Este rasgo hace fácil y económica la renovación del asiento para otro largo período de duración.

(2) Las inserciones Compound-308 duran de tres a cinco veces más, reduciendo grandemente el defecto de asiento de válvula.

## MISSION *Slush Pump* PISTONS

*"Change the Rubbers and Save the Pistons"*

These pistons are world leaders because:

(1) They give longer, trouble-free service before requiring attention.

(2) Rubbers are easy and economical to replace when they are finally worn.

*"Cambie las piezas de caucho y salve los émbolos"*

Estos émbolos son los principales del mundo porque:

(1) Dan servicio más largo y exento de irregularidades antes de necesitar atención.

(2) Las piezas de caucho pueden renovarse con facilidad y economía cuando finalmente se desgastan.

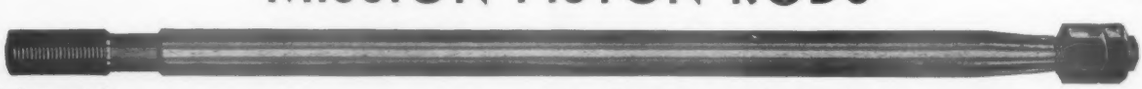
## MISSION *Self-Sealing* GLAND PACKINGS

Six years of field service have proved that Mission Self-Sealing Gland Packings give longer packing and rod life without frequent tightening of packing.

Pump pressure automatically tightens packing—assuring a positive seal at all times.

Seis años de servicio práctico en el campo han demostrado que las empaquetaduras de manguito de cierre automático Mission dan mayor duración de empaquetadura y varilla, sin tener que apretar con frecuencia la empaquetadura. La presión de la bomba aprieta automaticamente la empaquetadura, asegurando un cierre positivo en todo momento.

## MISSION PISTON RODS



These Rods are made in two styles:

**File Hard Rods** which give long, satisfactory service.

**Super-Surfaced Rods** which have a hard corrosion proof super-surface in addition to the file hard surface. They last from two to four times longer than File Hard Rods.

Estas varillas se hacen en dos estilos:

Las varillas File-Hard que dan largo y satisfactorio servicio.

Varillas Super-Surfaced, que tienen una superficie exterior dura a prueba de corrosión en adición a una superficie muy dura. Duran de dos a cuatro veces más que las varillas File-Hard.

A complete Mission Catalog is available on request. Just write either the export office or the Mission Plant. If a composite catalog is near, look for the Mission section.

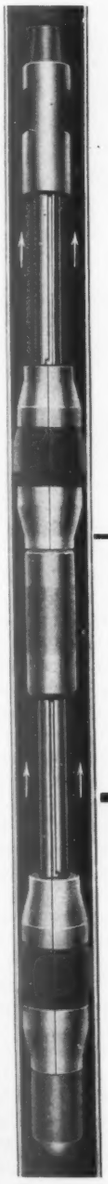
Mission Products are favorites all over the world. Order them and discover a new standard of economical, dependable performance.

Piden un catálogo a la Planta Mission y si acaso tienen un catálogo Composite vean la sección Mission.

Los productos Mission son preferidos en todo el mundo, pídalos y descubriran el funcionamiento económico y seguro.

# PRODUCTS

## Dependable, economico cumplimiento es el lenguaje de los aceiteros.



## MISSION PLUG VALVES with *Automatic* LUBRICATION

These valves turn easily, seal perfectly and give long service. The chief reasons for this outstanding performance are:

(1) Automatic lubrication assures a perfect seal and easy turning at all times.

(2) The Super-Surfaced core assures longer life.

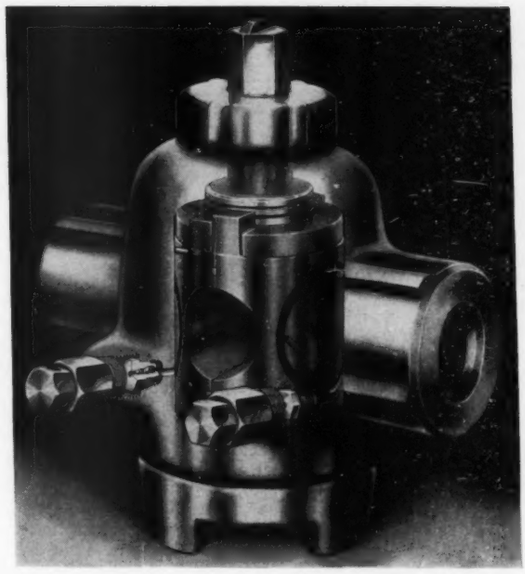
(3) The straight, split core cannot wedge—yet it seats perfectly. This means easy turning and positive sealing.

Estas válvulas giran facilmente, cierran perfectamente y duran mucho tiempo. Las razones principales de este sobresaliente funcionamiento son:

(1) La lubricación automática asegura un cierre perfecto y fácil rotación en todo momento.

(2) El núcleo Super-Surfaced asegura más duración.

(3) El núcleo recto, dividido no puede trabarse, y al mismo tiempo se ajusta perfectamente al asiento. Esto significa fácil rotación y cierre positivo.



A phantom view of the Mission Plug Valve showing lubricant grooves completely encircling each port, and reservoirs which force lubricant automatically (by line pressure) into the sealing grooves. Also the wedge-proof core, and the general interior construction is shown.

Vista diagramática de la válvula de tapón Mission, mostrando las ranuras de lubricación alrededor completo de cada orificio y depósitos que inyectan lubricante automaticamente (por presión de tubo) en las ranuras de cierre. También el núcleo y la construcción interior en general, se presentan aquí.

## MISSION VALVELESS SWABS

The split rubber principle of these swabs gives faster swabbing with safety. The fluid passage is the greatest of any swab and the design is rugged. The result is fast, safe, swabbing under most difficult conditions.

El principio de caucho dividido de estos escobillones o limpiatubos asegura limpieza más rápida con toda seguridad. El paso del flúido es el más grande de todo escobillón y su construcción es muy resistente. El resultado es una limpieza rápida, asegura y efectiva bajo las condiciones más difíciles.

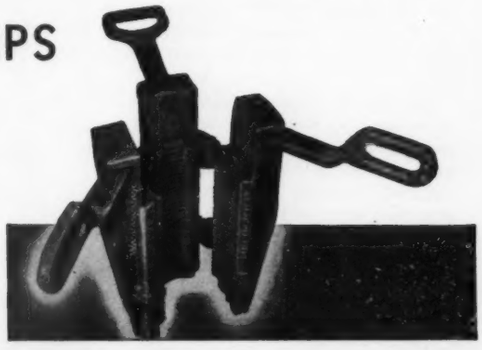
## MISSION *Rolling Dog* SLIPS

These Slips handle pipe faster and safer because they grip positively and release instantly *every time.*

There's a size and style of Mission Rolling Dog Slips to fit your needs. There are full size rotary slips, casing slips in all sizes and tubing spiders.

Estos sujetadores manejan la tubería con mayor rapidez y seguridad porque agarran positivamente y sueltan instantaneamente *cada vez.*

Hay un tamaño y estilo de sujetador Rolling Dog Mission para adaptarse a cada requisito. Hay sujetadores giratorios de tamaño completo, sujetadores de tubería de revestimiento de todos los tamaños y garras para tubos.



# MISSION MANUFACTURING CO.

HUMBLE ROAD, HOUSTON, TEXAS

EXPORT OFFICE: 30 ROCKEFELLER PLAZA, NEW YORK

portant feature when faced with heaving or sloughing shale. A motor-driven centrifugal pump is used to force mud at a high velocity into the centrifuge chamber where the sand is thrown to the outside and allowed to drop to the bottom of the cone-shaped vessel where a small stream of water helps wash it through an orifice.

For completion of wells, an oil-base drilling fluid has been designed. Use of oil eliminates the danger of plugging the formation and thus reducing the well's productivity. Stove oil of 38° gravity is used as a base and calcium carbonate in powder form, lamp black and air-blown asphalt added. The lamp black gives gel strength and the asphalt gives a plastering effect. As a plugging agent, mica is used. If weight is desired, it is obtained through the addition of barytes.

## Hole Sizes Reduced

Reduction in the investment necessary to complete a well is being effected through a wider adoption of smaller diameter holes. One company is now using 6¾-in. hole and 4½-in. casing in its Mid-Continent drilling program. The drilling is done with portable rigs mounted on trucks which were described briefly in the forepart of this article. Other companies are using similar rigs or regular full-sized rigs and drilling 7¾-in. hole and running 5½-in. casing.

There is no standard program although some companies adopt only one hole size and one size of casing. However, the problem is being examined closely and the trend is to smaller holes on wells of all depths. This naturally means some changes in operating technique as the clearance between the drill pipe and the hole is reduced. The 7¾-in. hole may be drilled with 4½-in. drill pipe but this leaves little room for fishing. The 6¾-in. hole is drilled with 3½-in. drill pipe and here again there are limitations placed on the size of fishing tools. However, overshots have been developed which can be used in such cases. On deeper wells the 8¾-in. holes provide no complications as there are a large number of tools which can be used to recover a fish.

The 3½-in. external upset drill pipe used on the small holes has tool joints with an outside diameter of 5 in. While rotating, the tools naturally contact the wall of the hole frequently and the wear on the tool joints is appreciable and a serious problem. The use of double box or double-pin drill pipe coupled with double-pin or double-box subs, respectively, has helped in solving this problem. Stabilizers, heavy rubber collars used immediately above the joints, are also helpful. Oversize joints are also used widely.

## Rotary Speeds and Bit Weights

It has been recognized for some time that the rate of penetration is a straight line function of the rotary speed, but in the case of bit weight it is a straight line functioning up to the crushing point of that particular rock and after that it rises rapidly. This crushing point may be as low as 15,000 lb. per sq. in. in some cases to as high as 100,000 lb. per sq. in. in others. Obviously, the latter weight is impossible to attain, but in most formations the crushing point is around 40,000 to 60,000 lb. per sq. in.

Rotary speeds have been increased to as much as 750 r.p.m., although in common practice 400 r.p.m. is rarely exceeded and this rate is used only in incompetent formations where a rock bit with comparatively few and long teeth is employed. As the formations get harder and the bits used have more and shorter teeth, the rotary speed is reduced. Attempts to use high rotary speeds in hard rock have not been successful as the increase in drill pipe trouble more than offset the increase in the rate of penetration.

Where multiple drill collars have been tried (six or eight 30-ft. collars) there has been a high mortality rate with a tendency to break in either the box or pin. It has been noted that the breaks occur most frequently in the uppermost drill-collar connection. There also seems to be some relationship between the size of the hole and the trouble with drill-collar breakoffs. In a 6¾-in. hole it appears that two collars can be run without any trouble, three develop considerable trouble in the upper connection and four will cause numerous breakoffs. In an 8¾-in. hole three collars will produce practically no trouble while four will develop trouble and five will cause frequent fishing jobs. It should be noted that where the formations are hard, and must be ground away, it has been cheaper to reduce the rotary speed. The rate of penetration is adversely affected but trouble is reduced.

*(Continued on Page 194)*

mación y reducir así la productividad del pozo. Como base se emplea petróleo de 38 grados de gravedad o densidad, y éste se agrega carbonato de calcio en polvo, negro de humo y asfalto soplado. El negro de humo imparte fuerza a la preparación gelatinosa y el asfalto le da un efecto de emplastadura. Como agente tapador se usa mica. Si se desea peso, esto se obtiene con la adición de baritas.

## Se reducen los tamaños de los agujeros

La reducción de la inversión necesaria para completar un pozo es está efectuando por una mayor adopción de agujeros de menor diámetro. Una compañía está ahora usando un agujero de 6¾ pulgadas y un entubamiento de 4½ pulgadas en su programa de perforación en la zona central. La perforación se hace con aparejos o torres portátiles, montados en camiones, como los descritos ya en este artículo. Otras compañías están usando torres similares o torres de tamaño completo y perforando agujeros de 7¾ pulgadas y metiendo tubería de 5½ pulgadas.

No hay un programa normal o uniforme, a pesar de algunas compañías han adoptado un tamaño de agujero y un tamaño de tubería. Sin embargo, el problema se está estudiando con cuidado y la tendencia es hacia agujeros más pequños para pozos de cualquiera profundidad. Esto, naturalmente, significa algunos cambios en la técnica del trabajo, debido a que la distancia entre la tubería de perforación y el agujero queda reducida. El agujero de 7¾ pulgadas puede perforarse con tubo de perforación de 4½ pulgadas, pero esto deja poco espacio para pescar. El agujero de 6¾ pulgadas se perfora con un tubo de perforación de 3½ pulgadas y aquí se presenta de nuevo una considerable limitación a las herramientas pescadoras. Se han perfeccionado, sin embargo, herramientas especiales para semejantes casos. En los pozos más profundos con agujeros de 8¾ pulgadas no se presentan complicaciones, a causa de que hay un gran número de herramientas que pueden adaptarse a su diámetro.

El tubo de perforación de 3½ pulgadas de recalcado exterior que se usa para los agujeros pequeños tiene uniones de espiga y caja para herramientas con un diámetro exterior de 5 pulgadas. Durante la rotación, estas uniones naturalmente entran en contacto con la pared del agujero y se desgastan, lo cual constituye un serio problema. El uso de un tubo de perforación de doble caja o doble pasador ha ayudado a resolver este problema. Los estabilizadores, pesados collares de caucho usados inmediatamente arriba de las uniones, han sido también de gran ayuda. También se usan mucho las uniones de sobretamaño.

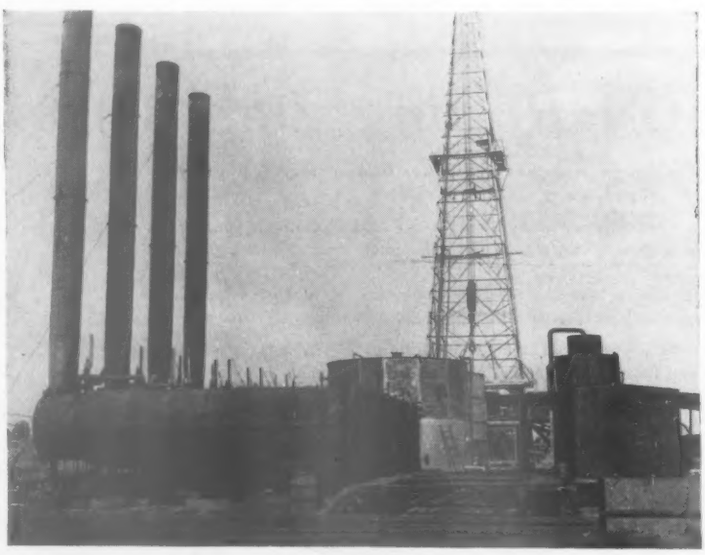
## Velocidades le rotación y pesos de barrenas

Desde hace tiempo se ha visto que la rapidez de la penetración es una función de línea recta de la velocidad de la rotación, pero en el caso del peso de la barrena, es una función de línea recta hasta el punto de tritutación de la roca en particular, y a continuación de esto, corre rapidamente. Este punto de tritutación puede bajar hasta 15.000 libras por pulgada cuadrada en algunos casos, y subir hasta 100.000 libras por pulgada cuadrada en otros casos. For supuesto, este último peso es excepcional, pero en la mayor parte de las formaciones el punto de tritutación es de 40.000 a 60.000 libras por pulgada cuadrada.

Las velocidades de rotación se han aumentado hasta 750 rpm., a pesar de que en la práctica ordinaria rara vez se pasa de 400 rpm., advirtiéndose que esta velocidad se usa sólo en formaciones incomptentes, en las cuales se usa una barrena de roca con comparativamente pocos dientes largos. A medida que se endurecen las formaciones y las barrenas usadas tienen un mayor número de dientes más cortos, se reduce la velocidad de rotación. No han resultado satisfactorias las pruebas de usar altas velocidades de rotación en rocas duras, pues el aumento en molestias con el tubo de perforación no compensa el aumento en rapidez de penetración.

Donde se han usado collares de perforación múltiples (seis u ocho collares de 30 piés) se ha observado una gran destrucción, acentuándose ésta en la caja o el pasador. Se ha visto que la rotura ocurre mas frecuentemente en la conexión de más arriba. También parece que existe cierta relación entre el tamaño del agujero y la destrucción de los collares de perforación. En un agujero de 6¾ pulgadas se ha visto que se pueden usar dos collares sin ninguna dificultad, pero se desarrollan muchas molestias en la conexión supe-

*(Continue en Pagina 194)*

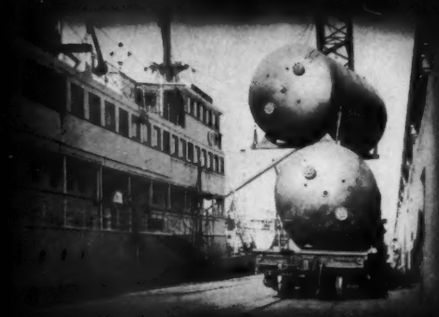


*Several types of insulation have become popular on boilers supplying steam to rotary rigs. This battery of domeless boilers is equipped with an asbestos coating covered by a sheet-metal jacket*

*Varios tipos de aislamiento se han hecho populares en las calderas que suministran vapor a los aparejos de rotativa. Esta batería de calderas sin cupula esta equipada con una capa de asbesto protegida por una cubierta de lámina metálica*

# Many Years Successful Operation

## in South America



*Loading Petreco Units for Shipment to South America*

*Eight Petreco Units en route to dock for loading on ship*

For many years Petreco has been exporting Electric Dehydrators to South American producers. Petreco engineers have flown and sailed thousands of miles to assist in the installation and operation of these plants. This long term business relationship and the efficiency and economy of the Petreco Process has, for Petreco and its South American friends, put a real meaning in the phrase "Good Neighbors".

Petreco is ready at all times to assist the petroleum industry with any dehydrating or desalting problem.

DESDE hace muchos años Petreco ha estado exportando deshidratadores eléctricos a los productores sudamericanos. Los ingenieros de Petreco han volado y navegado millares de millas para ayudar en la instalación y operación de estas plantas. Estas relaciones comerciales mantenidas desde hace tanto tiempo, lo mismo que la eficacia y economía del procedimiento Petreco, han introducido, en beneficio de Petreco y sus amigos en la América Latina, un verdadero significado a la frase de "buenos vecinos".

Petreco está preparada, en todo momento, para ayudar a la industria del petróleo, a resolver cualquier problema de deshidratación o desalazón.

PETROLEUM RECTIFYING COMPANY OF CALIFORNIA

*General Offices:* Los Angeles, California

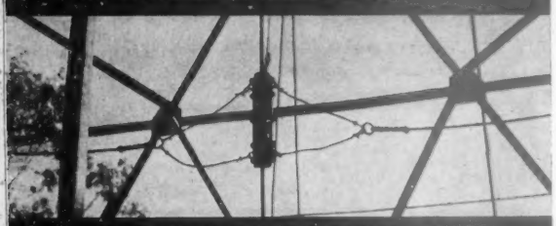
*Gulf Coast Division:* Houston, Texas — *Eastern Division:* Toledo, Ohio

*Representatives in Principal Oil Fields and Refining Centers*

**PETRECO**

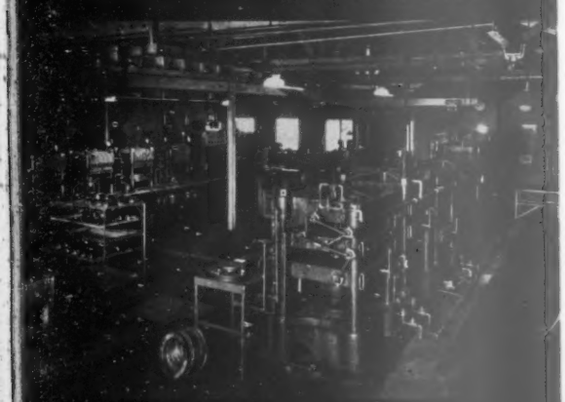
**DEHYDRATING DESALTING**

PATTERSON-BALLAGH PROTECTORS SAVE PIPE



PATTERSON-BALLAGH WIRE LINE GUIDE ADDS LINE LIFE

PATTERSON-BALLAGH PIPE WIPER STRIPS PIPE



CENTRAL BAY OF PATTERSON-BALLAGH PRESS DEPT.

PATTERSON-BALLAGH PLANT, LOS ANGELES

# PATTERSON-BALLAGH OIL FIELD *Specialties*

## *"Best Bet Yet"*

**Cada producto de Patterson-Ballagh ha sido probado en la práctica. Los protectores Patterson-Ballagh llevan ya catorce años de servicio satisfactorio y se usan en la mayor parte de las instalaciones de perforación de pozos profundos en todas las Américas. El constante perfeccionamiento de la producción de caucho para servicio en campos petrolíferos ha resultado en máxima duración. Si es un producto de Patterson-Ballagh, puede estar seguro de que es lo *mejor del ramo*.**

### PROTECTORES DE LABIO

1. El más reciente desarrollo en protectores enteramente de caucho. Un perfeccionamiento exclusivo de Patterson-Ballagh. Los labios gruesos agregados arriba y abajo imparten completa forma perfilada; evitan que el tubo de perforación sufra daños. De todos los tamaños.

### ESTABILIZADORES

2. Para perforación de agujero a descubierto. Estabiliza el tubo. Reduce la vibración del tubo. Impide el desgaste excesivo de la unión para herriamientas. De caucho especialmente tratado y completamente uniforme.

### PROTECTOR DE TUBERIA

3. Evita efectivamente el desgaste destructivo del collar. Ajusta sobre el collar o en el recalco de la tubería. Se hace de material plástico especial de gran resistencia al petróleo.

### PROTECTORES DE VARILLA DE BOMBA

4. Evitan que las varillas y los acoplamientos se desgasten por el roce con la tubería. Se ofrecen en dos tipos. El tipo de varilla se instala lateralmente en la varilla. El tipo de acoplamiento se instala en el vástago de la caja.

### PISTOLA DE LODO DE SEGURIDAD

5. Un dispositivo muy efectivo para agitar y mezclar el lodo en el foso. Se mueve en cualquiera dirección y puede cerrarse en cualquier posición. Un hombre solo la maneja. Empaquetadura especial de duración ilimitada. Boquilla de caucho muy durable.

### PISTOLA DE LODO SUPER UNIVERSAL

6. El más reciente tipo. De acero fundido, con doble paso compensado, para trabajo en que el lodo se inyecta sobre una base de 24 horas. Se cierra en cualquier posición. Puede equiparse con múltiple de 4 vías.

### LIMPIADOR DE TUBO Y TUBERIA

7. Disco de caucho de una sola pieza, reforzado, de trabajo pesado. Se loca debajo de la plataforma. Limpia muy bien el tubo y la tubería. Evita que las herramientas caigan en el agujero. Ahorra agua de lavar. Tamaños de 9 a 19″.

### LIMPIADORES DE KELLY

8. Disco de caucho que limpia al kelly de todo el lodo. Se ofrece con aberturas rectangulares, hexagonales o octagonales. Se inserta dentro del buje del kelly. Accesorios o guarniciones especiales.

### LIMPIADORES DE VARILLA DE BOMBA

9. Se ofrecen en dos tipos: normal y universal. Ilustramos aquí este último. Caja compacta. El tipo de arriba está equipado con caja de doble cierre. Dos discos de completa flotación limpian efectivamente la varilla de bomba.

### LIMPIADORES DE CABLES DE ALAMBRE

10. Dos estilos—estilo A y estilo B. Ilustramos aquí este último. La caja de acero del tipo B contiene el bloque de caucho y se sujeta por grapas de resorte. La pieza de acero fundido está abisagrada.

### GUIAS DE CABLES DE ALAMBRE

11. Se usan en todos los trabajos de perforación. Dan protección a los cables de alambre. A prueba de chispas. Evitan la vibración. Aseguran correcto arrollamiento. No hay astillas que salten a los ojos de los trabajadores. Se ofrecen en varios tamaños.

### AMORTIGUADORES DE ASAS DE ACHICADOR

12. Evitan el desgaste de las asas y soportes del evacuador. Eliminan el contacto de metal contra metal entre las articulaciones y el soporte giratorio del elevador. El bloque amortiguador de caucho se ajusta a todo tipo de soporte giratorio.

*See Composite Catalog*

**PATTERSON-BALLAGH CORPORATION**

*Plant:* 1900 E. 65th St., Los Angeles, Calif. *New York Export Office:* 92 Liberty St. *Mid-Continent Office:* 1506 Maury St., Houston, Texas.

## LIP PROTECTORS

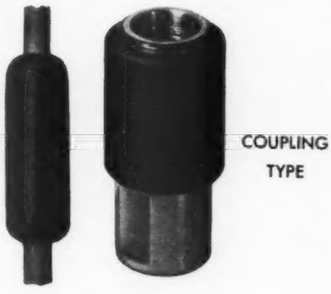
**1** Latest development in all-rubber Protectors. An exclusive Patterson-Ballagh improvement. Heavy lips added at top and bottom give full streamlining; prevent drill pipe from "ringing." All sizes.

## STABILIZERS

**2** For open hole drilling. Stabilize the pipe. Reduce whip in pipe. Prevent excessive tool joint wear. Rubber specially cured, uniform throughout.

## TUBING PROTECTORS

**3** Effectively overcome destructive collar wear. Fit over collar or upset of tubing. Made of special oil-resistant plastic material.




## SUCKER ROD PROTECTORS

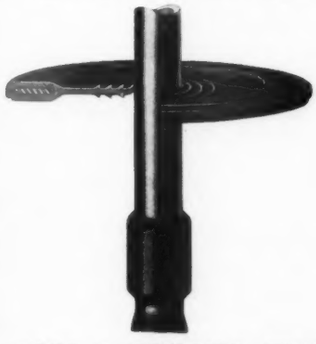
**4** Prevent rods and couplings from wearing against tubing. Made in two types. The Rod Type is slideably mounted on rod. The Coupling Type is mounted on Pin Box.

## SAFETY MUD GUN

**5** Effective device for agitating and mixing mud in pit. Swings in any direction and can be locked in any position. One man can operate. Special long-life packing. Durable rubber nozzle.

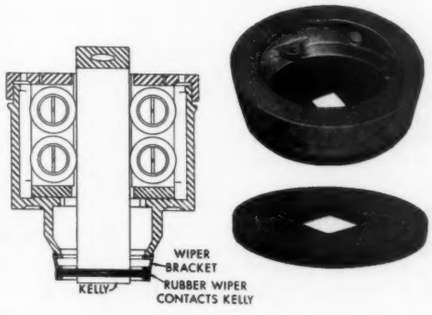
## SUPER UNIVERSAL MUD GUN

**6** Latest type. Heavy cast steel, double balanced flow, for operations where mud is jetted on 24-hour basis. Locks in any position. Can be equipped with 4-way manifold.



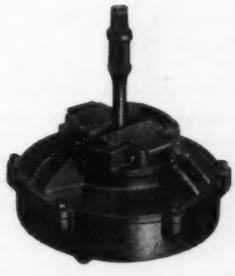
## PIPE & TUBING WIPER

**7** Heavy-duty one-piece rubber disc, reinforced. Sets under table. Strips pipe and tubing cleanly. Prevents tools dropping into hole. Saves wash water. Sizes 9" to 19".




## KELLY WIPERS

**8** Heavy rubber disc completely strips Kelly of mud. Available with square, hexagonal and octagonal openings. Inserted within Kelly bushing. Special fittings.



## SUCKER ROD WIPERS

**9** Made in two types, Standard and Universal. The latter is illustrated. Compact housing. Two freely floating discs effectively wipe rods.

## WIRE LINE WIPERS

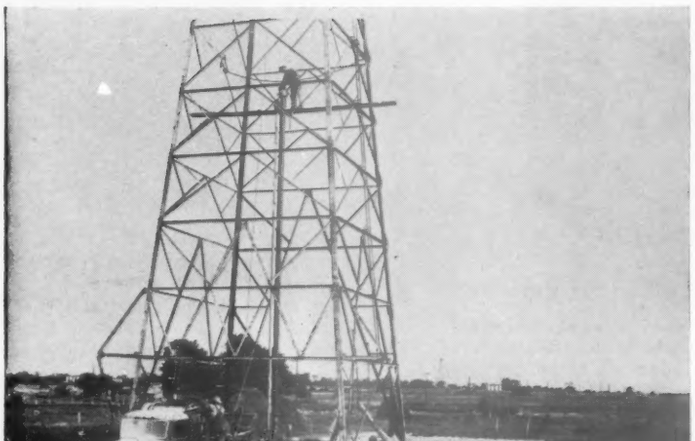
**10** Two types—Style A and Style B. The latter is illustrated. Steel housing of Type B holds rubber filler block and is held by spring clips. Steel casting is hinged.

## WIRE LINE GUIDES

**11** Used in every drilling field. Saves wire line. Spark-proof. Prevents vibration. Assures proper spooling. No splinters to fall in crew's eyes. Made in various sizes.

## SWIVEL BAIL BUMPERS

**12** Prevent wear on swivel and elevator bails. Keep elevator links free from metal-to-metal contact with swivel. Rubber bumper block fitted to castings for every type of swivel.



*One of the types of portable spudding machines used for completing shallow wells. Other similar units are equipped with double drums, self-raising masts, spudding arms, etc. Same machines are used for maintenance and repair work*

*Uno de los tipos de máquinas portátiles de perforación inicial usado para completar pozos de poca profundidad. Otros equipos similares están equipados con tambores dobles, mastiles de levantamiento automático, brazos de perforación, etc. Las mismas máquinas se usan para trabajos de conservación y reparación*

## Drilling With Casing

An interesting experiment is being conducted in California to determine the feasibility of using drill casing. The casing is used for a drill stem and then is run in the hole as the oil string to complete the well. The casing used has been 4½ and 5½-in. pipe and no outstanding trouble was experienced with the threads. However, it should be noted that this experiment was conducted in an area where the formations were relatively soft and the strain on the drill pipe was light.

## Steam Tongs

One of the problems accompanying the use of casing for drill pipe was the makeup of the threads. This was done with geared tongs, using steam for power. Steam-powered tongs are applied to the pipe as soon as the section (single or thribble) of pipe is stabbed into position. The pipe is then spun up by the tongs, a constant torque being applied. This prevents damage to the threads resuling from the use of a spinning line. Another application of this tong is in the running of long strings of casing.

## Removable Casing

This item, an aluminum alloy or a magnesium alloy pipe, has been used for several years, the removable section being run opposite an upper producing horizon. Both magnesium and aluminum are vital defense materials and there may be some curtailment of the use of removable casing. At the present time there are several ways of removing the aluminum pipe. An expanding wall scraper can be used, a charge of solidified nitroglycerin can be run or a cable-tool underdigger can be used on the aluminum pipe. Acid or shot removes the magnesium pipe.

There has been some black merchant pipe run as a removable section and this requires a milling tool to remove, although a wall scraper could do the work. Where it is desired to open up steel pipe to expose an upper producing horizon, an expanding mill can be used or a whipstock run and a mill used to drill off of the face of it and out through the pipe.

Another method which has been developed is the removal of steel casing by gun perforating. Previously this tool was used only for providing a certain number of openings through the casing. Now, through the use of the various types of bullets (sharp nose, hollow-point and mushroom) the entire casing section opposite a producing horizon can be removed.

## New Explosive

A new explosive which is safe has been introduced in the oil fields although it is not yet in commercial production. Its composition has not been revealed. It comes in small cans and these can be run in the well in a dump bailer and placed. The velocity of detonation is slightly slower than liquid nitroglycerin but it does have greater disruptive force. To show how safe it is, demonstrators often fire a bullet from a high-powered rifle into a canister without resulting detonation.

## Instrumentation More Widely Used

On deeper wells there has been a demand for instruments which will record the various important functions. Rate of penetration recorders of several different types are now available. One of these works on a hydraulic principle, another on a mechanical and the third uses a pair of Selsyn motors. There is also an increasing demand for recording weight indicators and for increased

*(Continued on Page 200)*

rior al emplearse tres collares, y en el caso de cautro collares, las roturas son numerosas. En un agujero de 8¾ pulgadas, tres collares no producen casi ningún inconveniente, mientras que cuatro causan molestia y cinco resultan en frecuentes trabajos de salvamento. Bueno es observar que donde las formaciones son duras y es necesario amolarlas, resulta más económico reducir la velocidad de la rotación. La rapidez de la penetración es afectada adversamente, pero se reduce la molestia.

## Perforación con tubos para pozos

Un interesante experimento se está llevando a cabo en California para averiguar si es posible usar tubos para pozos como medio de perforación. El tubo se utiliza como vástago de perforación y se pasa por el agujero como entubamiento de petróleo para completar el pozo. El tubo usado ha sido de 4½ y 5½ pulgadas y no se ha experimentado ninguna seria dificultad con las roscas. Sin embargo, debemos añadir que este experimento fué llevado a cabo en una zona en que las formaciones son relativamente blandas y la tensión sobre el tubo de perforación es muy limitada.

## Garras de vapor

Uno de los problemas que se presentan con el uso de tubo de revestimiento para la perforación es el de las roscas. Esto se hizo con garras de engranaje, usando vapor como fuerza. Las garras accionadas a vapor se aplican al tubo tan pronto como la sección (sencilla o triple) se coloca en posición. El tubo se gira luego por las garras, aplicándose un constante esfuerzo de rotación. Esto evita el daño a las roscas que pudiera resultar del uso de una línea giratoria. Otra aplicación de estas garras es en el manejo de largas series de tubos de revestimiento.

## Revestimiento removible

Este artículo, un tubo de aleación de aluminio o de aleación de magnesio, se ha usado, desde hace varios años, y se ha colocado al frente de un horizonte productor superior. Tanto el magnesio como el aluminio son materiales muy importantes para la defensa nacional y por esta razón podrá presentarse una limitación en el uso de revestimiento removible. Al presente hay varias maneras de remover el tubo de aluminio. Se puede emplear un rascador de extensión, una carga de nitroglicerina solidificada o una herramienta de cable especial para quitar el tubo de aluminio. El tubo de magnesio se quita con ácido o dinamitación.

Se ha empleado cierta tubería comercial, como sección removible, pero esto requiere una herramienta fresadora, para el trabajo de quitarla, a pesar de que esto podría también hacerse con un raspador de pared. Cuando se desea abrir un tubo de acero, para exponer un horizonte productor superior, se puede usar una fresadora de extensión.

Otro método perfeccionado para quitar el tubo de acero es la perforación a tiro. Anteriormente, la pistola de perforación se usaba para hacer cierto número de perforaciones en la tubería. Actualmente, debido al uso de varios tipos de balas (de punta aguda, de punta plana y tipo de hongo) la completa sección de tubería al frente del horizonte productor puede quitarse sin dificultad.

## Nuevo explosivo

Un nuevo explosivo, que ofrece la ventaja de no ser peligroso, se ha introducido al mercado, pero todavía no se produce en cantidades comerciales. Su composición es un secreto al presente. Se vende en latas pequeñas y éstas pueden introducirse en el pozo y colocarse en el punto que se quiera. La velocidad de la detonación es levemente menor que la de la nitroglicerina líquida, pero tiene, por otra parte, mayor fuerza disruptiva. Para mostrar lo seguro que es, los demostradores a menudo disparan un balazo con un rifle de gran fuerza dentro de la lata, sin que se produzca detonación.

## Mayor uso de instrumentos

Para pozos profundos existe creciente demanda de instrumentos que acusen todas las importantes funciones. Hay ahora indicadores de velocidad de penetración de varios tipos. Uno de ellos funciona sobre un principio hidráulico, otro, sobre un principio puramente mécanico y un tercero se vale de un par de motores de sincronización automática. Hay también creciente demanda de indicadores de peso y una tendencia general hacia mayor exactitud en este sentido. La velocidad de la rotación, el total de revoluciones, el esfuerzo de rotación y la presión de las bombas se están también registrando con creciente frecuencia. También se han introducido varios instrumentos para llevar cuenta del peso o de la viscosidad del lodo, o ambas cosas. Su aplicación es importante, pues en un pozo profundo puede con el obtenerse la completa historia ciclica del lodo.

## Circulación invertida

La circulación invertida se usa ahora mucho más para la terminación de pozos que tienen una presión de formación alta o mediana. El medio de circulación (petróleo) se inyecta por la tubería de revestimiento y sale por la cañería. La creciente velocidad es suficiente para sacar hasta grandes piezas de acero. La barrena no tiene canales de agua sino una sola abertura grande. Quitando la presión sobre la formación y reduciendo la exposición al agua o lodo, se obtiene una mejor terminación del pozo. También hay un ahorro en tiempo, pues un pozo podrá terminarse en 48 horas si no hay que hacer detonaciones, o en 120 horas cuando hay que valerse de detonación.

Una herramienta valiosa desarrolla-

*(Continue en Pagina 200)*

# A COMPLETE *First Aid* PROGRAM
## For Overseas Drilling!

★ Here's a line-up of Bowen Fishing Tools that are essential for overseas drilling operations. With these tools on your rig, you'll lick practically any fishing job that comes along ... whether it's small junk lost in the hole . . . a twistoff . . . a stuck string of pipe or casing . . . or any other job that calls for fast work *and the right tools!*

And notice one thing about all these Bowen Tools—their *simple, rugged construction.* When you're far away from machine shops or other ordinary facilities it's mighty good to know you've got fishing tools that will stand on their own feet. There are no unnecessary parts in Bowen Tools to break down at the wrong time—*but they do have operating features all their own that make them efficient, fast and always dependable!*

Take time—now—to look these tools over carefully and see for yourself how they meet *your* standards for safety and fool-proof operation on the toughest jobs. *Then write Bowen for full details!*

★ Este surtido de herramientas de pesar Bowen es esencial para los trabajos de perforación en el extranjero. Con estas herramientas en su aparejo de perforación, podrá hacer casi cualquier trabajo de pescar que se presente—ya se trate de un pequeño útil perdido en el agujero . . . un retorcimiento . . . una tubería de producción o de revestimiento atascada . . . ya de cualquier otro trabajo que requiera rápida atención y las *correctas herramientas* para su inmediata ejecución.

Sírvase tomar nota de una cosa acerca de estas herramientas Bowen—su construcción *sencilla y firme.* Cuando uno esta bien alejado de talleres de máquina o de otras facilidades ordinarias, resulta en gran alivio y seguridad el saber que se cuenta con herramientas de pescar que pueden hacer muy bien el trabajo. En las herramientas Bowen no hay piezas innecesarias, expuestas a romperse a cualquier momento. Todas estas herramientas tienen rasgos, exclusivos, que les imparte la *facultad de poder hacer el trabajo con rapidez, facilidad y seguirdad.*

Le recomendamos que estudie ahora con detención estas excelentes herramientas, para que vea Vd. mismo cómo se adaptan idealmente a sus normas de seguirdad, para hacer un trabajo eficaz y rápido, por deficil que sea. Sírvase escribir a la Bowen por información completa.

**BOWEN CASING CUTTER**

A precision tool for cutting casing, drill pipe or tubing. Ideal for "cut and pull" jobs. Simple to operate and won't slip down pipe after cutting begins. Withstands operating stresses at all depths. Can be set and released as often as desired *without coming out of hole.*

**CORTATUBOS DE POZO BOWEN**

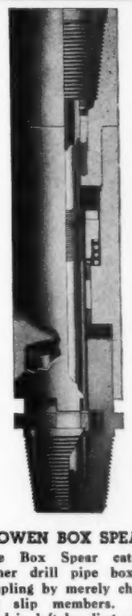
Una herramienta de precisión para cortar tubería de revestimiento, tubo de perforación o tubería de producción. Ideal para trabajos de cortar y quitar. Fácil de manejar. No se resbala por el tubo después de empezar a cortar. Soporta o resiste las tensiones del trabajo a cualquiera profundidad. Puede fijarse y soltarse las veces que se quiera, *sin que salga del agujero.*

**BOWEN RELEASING OVERSHOT**

Catches drill pipe, coupling or tool joint without changing slips or making adjustments. Spiral gripping member cinches tighter as load increases, yet releases with only a downward bump and a turn to the right. Built-in milling member trims ragged edges, insuring perfect gripping and packing off.

**ENCHUFE DE DISPARO BOWEN (OVERSHOT)**

Agarra el tubo de perforación, acoplamiento o unión de herramienta, sin cambiar manguitos o hacer ajustes. El miembro espiral de sujeción o agarro se pone más apretado a medida que aumenta el peso o carga, y se suelta con sólo un golpe hacia abajo y un giro a la derecha. Un miembro fresador, que forma parte integrante, suaviza los bordes asperos, asegurando una sujeción perfecta y segura obturación.



**BOWEN BOX SPEAR**

The Box Spear catches either drill pipe box or coupling by merely changing slip members. It's used in left handing wherever hole diameter is too tight for outside fishing tools and tool joint box or coupling is up. Makes up with a positive grip that never lets go *until you want it to.* Available in a range of sizes with slips threaded for all types of drill pipe.

**ARPON DE CAJA BOWEN**

El arpón de caja pesca la caja del tubo de perforación o el acoplamiento sencillamente cambiando los miembros del manguito. Resulta muy útil en agurejo de diámetro demasiado apretado para herramientas exteriores de pesca o cuando la caja de la unión de espiga de herramienta acoplamiento está arriba. Acciona con un agarro positivo que nunca se suelta, hasta que uno lo haga intencionalmente. Se ofrece en una amplia escala de tamaños con manguitos roscados, para todo tipo de tubo de perforación.

**BOWEN JUNK BASKET**

Made to retrieve every popular type bit cone as well as all small pieces of junk. Inner passages provide reverse circulation that enables *full pump pressure* to be used and permits circulating out of hole without losing fish. Also widely used for core recovery and hole straightening.

**CANASTA BOWEN PARA UTILES**

Sirve para atrapar cualquier tipo popular de cono de barrena, lo mismo que cualquier útil pequeño. Los conductos interiores proveen circulación invertida, que permite la utilización de la *completa presión de la bomba* para la circulación afuera del agujero, sin perder el util pesado. Se usa también para la recuperación de núcleos y enderezar agujero.

**BOWEN SAFETY JOINT**

This Safety Joint is designed for all drilling and fishing operations. Has only two simple parts—a pin and box section—equipped with high pressure packers to prevent leakage. Safely stands greater pulling or twisting strains than the string, and releases only at the will of the operator. Will deliver full torque capacity of string in *either* direction.

**UNION DE SEGURIDAD BOWEN**

Esta unión de seguridad sirve para todo trabajo de perforación y de pesca. Tiene sólo dos piezas muy sencillas—un pasador y una sección de caja—equipada con obturadores o tapones de alta presión, para impedir el escape. Soporta con seguridad mayores tensiones de empuje y retorcimiento que la serie o columna y se suelta sólo a voluntad del operario. Suministra toda la capacidad del esfuerzo de rotación en *cualquiera* dirección.

**BOWEN RELEASING SPEAR**

Just six simple parts enable this tool to stand hardest use. Used for jarring, "cutting and pulling," left-handing, and holding casing while last joint is cut for landing. Holds with a positive grip, yet release can be effected whenever desired.

**ARPON DE DISPARO BOWEN**

Sólo seis piezas muy sencillas permiten a esta herramienta resistir el uso más duro. Se usa en trabajos de salvamente por percusión, "corte y tiro," sacar tubería mientras la última unión se está cortando para su colocación. Sujeta con un agarro positivo, y puede dispararse o soltarse cuando se quiera.

**SPECIAL BOWEN ROTARY JAR**

The choice of operators everywhere for all jarring. No torque required for delivering the blow—just a straight pull. As many as *ten blows per minute* have been struck. It incorporates means for varying pull required to trip it *without coming out of hole.*

**PERCUSOR GIRATORIO BOWEN ESPECIAL**

La elección de los petroleros en todas partes para el salvamento de piezas. No se requiere esfuerzo de rotación para la producción del golpe—sencillamente un tiro recto. Se puede dar hasta *diez golpes por minuto.* Comprende un medio para variar el esfuerzo o tiro que se requiere para su disparo, *sin sacarlo del agujero.*

# BOWEN

**SR BOWEN CO**

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Pág. 17 "Cómo Usar el Diagrama de Capacidad"

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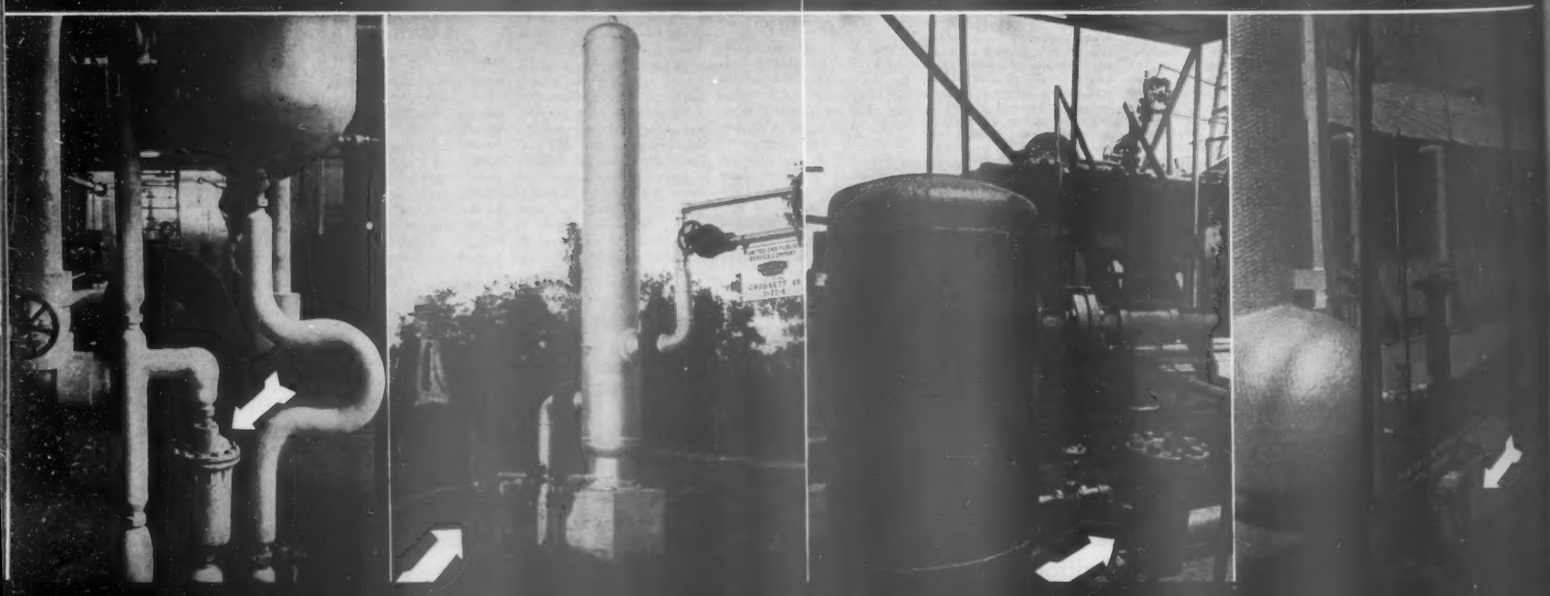
# Trampas Armstrong par la Industria Petrole



*In any language...*

# SPERRY-SUN

*spells*

# H-E-A-D-Q-U-A-R-T-E-R-S

*for Well Surveys*

*Administracion por*

## EL SURWEL
### CLINOGRAFO GIROSCOPICO

Registra automaticamente la dirección e inclinación de los pozos a cualquiera profundidad. Presenta un cuadro completo y exacto del progreso de la perforación y correcta posición del agujero a cualquiera profundidad. Rápido, exacto, seguro y de verificación automática. Capacidad, hasta 2000 registros. Completamente protegido por patentes.

### El clinógrafo SYFO

Mide la inclinación por medio de un nivel líquido. Los registros se hacen en unos pocos segundos y se obtienen inmediatamente a la llegada del instrumento a la superficie. Exacto, de verificación automática y económico en precio. Se usa en cable de alambre a como "go-devil". Patentado.

### METODO DE REMOCION DE SONDA K-K

Un nuevo método de quitar la sonda exploradora usada en la perforación direccional después de perforar aproximadamente 20 piés de agujero de desvio lateral.

### METODO DE ORIENTACION MAGNETICO

Un método rápido, exacto y de verificación automática, desarrollado para asegurar la correcta orientación de las herramientas deflectoras al fondo de un agujero. *Exacto hasta dentro de un medio grado, rápido* pues no se requiere ninguna orientación de vástago de perforación. *El trabajo lo hace un hombre solo desde el piso del aparejo de perforación.*

## EL NUEVO E-C
### (INCLINOMETRO ELECTROQUIMICO)

Un progreso verdaderamente notable en registro de desviación de agujero. Funciona con pilas secas, sobre establecidos principios electroquímicos. De verifación automática. Económico en precio de arriendo y costo de funcionamiento.

No se requiere ningún dispositivo cromométrico. Funciona con cable ordinario de medición. Fácil registro múltiple, con registros permanentes a inmediata disposición.

### INDICADOR DIRECCIONAL MAGNETICO H-K

Registra la inclinación y dirección fotográficamente en discos de papel. Se usa en agujeros a descubierto o en tubería de perforación, con cañón de sacanúcleo de cable de alambre. Tiene soporte flotante de brújula y anillo de filamento cruzado en soporte triangular y unidades de inclinación intercambiables. Exacto y de verificación automática. Arriendo diario a precio racional. Completamente patentado.

### SERVICIO DE ORIENTACION POLAR DE NUCLEOS

Rápido, económico y sin tiempo de perforación perdido. Los núcleos o muestras pueden elegirse a mano y enviarse de cualquiera distancia.

Consiste en determinar la orientación original en el terreno donde se sacan los núcleos durante la perforación y después de que las muestran se han traido a la superficie, identificando, por la polaridad magnética residual en los minerales pesados de la roca, los polos sur y norte del núcleo.

Los servicios se ofrecen a tarifas convenientes a los productores y contratistas de perforación, que prefieren registros hechos por ingenieros especialistas en esta clase de trabajo.

## The SURWEL
### GYROSCOPIC CLINOGRAPH

Records automatically direction and inclination of wells at any depth. Affords a true picture of drilling progress and correct location of the hole at any depth. Speedy, accurate, reliable and self-checking—capacity up to 2,000 records. Fully covered by patents.

## The SYFO Clinograph

Measures inclination by a liquid level. Records made in a few seconds and immediately available upon instrument reaching surface. Accurate, self-checking and inexpensive. Used on wire line, or as "Go-Devil". Fully patented.

### K-K WHIPSTOCK REMOVAL SUB AND METHOD

A new method of removing a whipstock used in directional drilling after approximately twenty feet of side-tracking hole has been made.

### MAGNETIC METHOD OF ORIENTATION

A fast, accurate, self-checking method developed to assure correct orientation of deflecting tools at the bottom of the hole. *Accurate to within one-half of a degree (½°), speedy,* as no drill stem orientation is required, *and the operation is done by one man on the derrick floor.*

## The NEW E-C
### (ELECTRO-CHEMICAL) INCLINOMETER

A truly great advance in recording hole deviation. Operated by dry cell batteries on sound electro-chemical principles. Self-checking. Low in rental charge and operating cost.

No timing device needed. Minimum recording time. Operates on ordinary measuring line. Multiple recording is easy—with permanent records instantly available.

## The H-K
### DIRECTIONAL MAGNETIC SINGLE SHOT

Records inclination and direction photographically on single paper discs. Used in open holes or in drill pipe, with non-magnetic sub or wire line core barrel. Has buoyant compass support and triangularly supported crosshair ring and interchangeable Inclination Units. Accurate and self-checking. Reasonable daily rates. Fully patented.

### POLAR CORE ORIENTATION SERVICE

Rapid. Inexpensive. No drilling time lost. Cores can be hand-picked and shipped from any distance.

Consists of determining the original orientation in the ground of cores obtained during drilling and after the core samples have been brought to the surface, by identifying through residual magnetic polarity in the heavy minerals of the rock, the North and South sides of the core.

Services rendered at reasonable rates to producers and drilling contractors who prefer records made by engineers trained for this service.

**SPERRY-SUN WELL SURVEYING CO.** 1608 WALNUT ST., PHILA., PA.

Branch Offices: Houston, Lubbock, Corpus Christi, and Fort Worth, Texas; Oklahoma City, Oklahoma; Long Beach and Bakersfield, California; Lafayette, Louisiana.

Sure . . . . There's a

# PORTABLE RIG

## FOR EVERY SOUTH AMERICAN DRILLING CONDITION

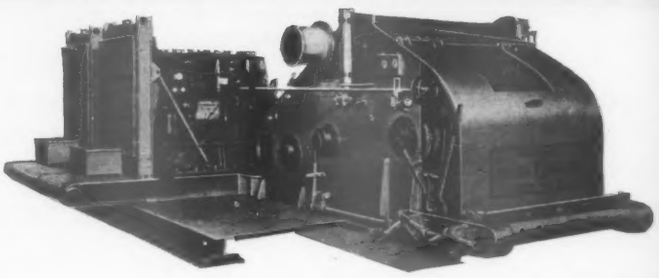
### MODEL 35 FOR 3000′ DRILLING

Showing draw works with single engine drive (dual engine drive can be furnished). Rig can be mounted on sub-structure of any desired height, or mounted on truck for well servicing and drilling where moves are frequent.

●

### MODELO 35 PARA PERFORACION DE 3000 PIES

Mostramos aquí el aparejo de maniobras o torno de extracción con un solo motor. Podemos suministrarlo también con propulsión por dos motores. El aparejo de perforación puede montarse en subestructura de cualquiera altura deseada, o montarse en camión para servicio y perforación de pozos, donde son frecuentes las mudanzas.



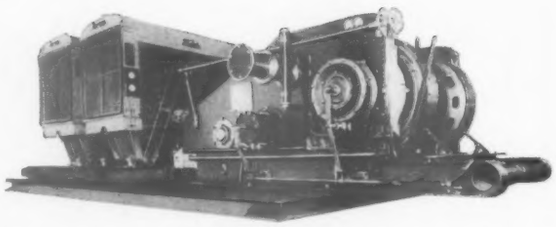
### MODEL R-876-8A FOR 7500′ DRILLING

Side view showing accessible controls at driller's position. Features: 8 speeds forward, six speeds reverse on drum, rotary shaft and sand reel; (Enclosed sand reel optional); Dual engine drive; heavy-duty friction clutches on drum and rotary shafts; air-controlled engine clutches; force-feed lubrication.

●

### MODELO R-876-8A PARA PERFORACION DE 7500 PIES

Vista lateral, en que se muestran los gobiernos al fácil alcance del empleado a cargo de la perforación. Rasgos: 8 velocidades hacia adelante, seis en retromarcha en el tambor, árbol giratorio y malacate de bomba de arena; (malacate de bomba de arena cubierto, a elección); propulsión por doble motor; embragues de trabajo pesado en el tambor y árboles giratorios; embragues de motor regulados por aire; lubricación de alimentación a presión.



### MODEL CT-5 FOR 6000′ DRILLING

Showing dual engine drive and controls centralized at driller's position. Other features: 5 speeds to drum and 4 speeds to rotary; large diameter shafting; heat-treated cut tooth steel sprockets, hydraulic control of clutches, force-feed lubrication.

### MODELO CT-5 PARA PERFORACION DE 6000 PIES

Mostramos aquí la propulsión por doble motor y los gobiernos centralizados al fácil alcance del operario. Otros detalles: 5 velocidades al tambor y 4 velocidades a la rotativa; árboles de gran diámetro; ruedas dentadas de acero tratado termicamente; gobierno hidráulico para los embragues; lubricación de alimentación a presión.

### GENERAL SPECIFICATIONS FOR THE ABOVE RIGS

| | R-876-8A | CT-5 | 35 |
|---|---|---|---|
| Depth Recommended | 7,500′ | 6,000′ | 3,000′ |
| **DRAW WORKS** | | | |
| Drum Shaft | 7⅜″ | 6½″ | 4¾″ |
| Line Shaft | 5″ | 4½″ | 3½″ |
| Rotary Shaft | 4½″ | 4¾″ | 3½″ |
| Brakes—Type | Water Cooled | Water Cooled (Optional) | Conventional |
| Brake Width | 10″ | 9¾″ | 8″ |
| Brake Drum Diameter | 40″ | 40″ | 36″ |
| Drum Spool Dimension | 18″x30″ | 18″x30″ | 16″x26″ |
| Drum Clutches | Friction | Friction | Friction |
| Speed on Drum | 8 Forward 6 Reverse | 5 Forward 3 Reverse | 3 Forward 1 Reverse |
| Rotary Clutch | Friction | Friction | Friction |

| | | | |
|---|---|---|---|
| Speed on Rotary | 8 Forward 6 Reverse | 4 Forward 3 Reverse | 3 Forward 1 Reverse |
| Rig Height—overall | 6′ 9″ | 5′ 0″ | 4′ 7½″ |
| Rig Length—overall | 14′ 6″ | 13′ 0″ | 10′ 0″ |
| Width on Derrick Floor | 6′ 11″ | 6′ 7½″ | 5′ 1½″ |
| Weight | 25,000 lbs. | 18,000 lbs. | 10,000 lbs. |
| **DUAL ENGINE DRIVE:** | | | |
| Shafts | 5 7/16″ | 5 7/16″ | 4″ |
| Lubrication | 2 Oil Pumps | 2 Oil Pumps | 2 Oil Pumps |
| Skids | 8″ 40 lb. H. Beam | 8″ 40 lb. H. Beam | 8″ 40 lb. H. Beam |
| Approximate Weight | 8,000 lbs. | 7,000 lbs. | 4,200 lbs. |
| SUBSTRUCTURE: Substructure may be furnished on any rig at height desired by operator. Engines specifications submitted on request. | | | |
| Bulletin Number | 876 | CT-5 | 35 |

**NOTE:** Pump Drives vary with make and size of pump and engine speed. All capacities are based on 4½-16.6 lb. drill pipe with tool joints.

**MAIN OFFICE AND PLANT**
1422 MAURY STREET
HOUSTON, TEXAS

## PORTABLE RIG COMPANY

**EXPORT OFFICE**
30 ROCKEFELLER PLAZA
NEW YORK
CODE—"PORTRIG"

Dallas, Kilgore, Corpus Christi, Odessa, Texas;
New Iberia, Louisiana.

PACIFIC COAST DISTRIBUTORS:
Wagner-Morehouse, Inc., Los Angeles

# *Wherever Oil Is Produced*

. . . the recognized answer to emulsion problems is Tret-O-Lite. Its general oil field use for many years has led to the development of varied compounds suitable for treating the different types of crude oil emulsions encountered.

If you have an emulsion problem, it's a job for the Tret-O-lite organization . . . phone or write for your nearest representative or Tret-O-lite office.

. . . la solución conocida del problema de la emulsión es Tret-O-lite. Su uso general en los campos petrolíferos, desde hace muchos años, ha conducido al desarrollo de diversas preparaciones adaptadas al tratamiento de los diferentes tipos de emulsiones de petróleo crudo que se presentan.

Si tiene Vd. un problema de emulsión, la organización Tret-O-lite se encargará de resolvérselo . . . comuníquese en seguida con nuestro representante más cercano o directamente con la oficina principal de Tret-O-lite.

**TRETOLITE COMPANY**

*Manufacturing Chemists*

**Webster Groves, St. Louis County, Missouri**
**Los Angeles, California**
*Representatives in All Principal Fields*

# TRET-O-LITE

DEMULSIFYING DESALTING

accuracy in this field. Rotary speed, total rotary revolutions, torque and pump pressure are also being recorded with increasing frequency. Also, several instruments have been introduced for recording either the weight or viscosity of the mud, or both. Their application is obvious as on a deep well the complete cyclic history of the mud can be obtained.

## Reverse Circulation

Reverse circulation is being more widely used for the completion of wells having a high or medium formation pressure. The circulating medium (oil) is forced down the casing and up through the tubing, the increased velocity obtained being sufficient to carry out even large pieces of steel. The bit has no water courses but a single large opening. By keeping pressure from the formation and minimizing exposure to water or mud, a better completion is obtained. There is also a saving in time as a well can be completed in 48 hours if no shot is used, or 120 hours if a shot is placed.

A useful tool developed for reverse circulation is the Snivie. An 18-in. nipple with three $\frac{7}{8}$-in. perforations in it is run immediately above the bit sub. A plunger with opposed valve cups is placed in the tubing and pumped down until it lodges in the bit sub and shuts off circulation through the bit and forces all of the fluid out through the perforations against the walls of the hole. This method is used for washing the sand face. When it comes time to recover the plunger, the circulation is established through the casing and up through the tubing.

## Deep Cable-Tool Drilling

Cable tools used for deep drilling are following the pattern set by rotary rigs used for medium-depth drilling. They are all being mechanized and unitized and particular stress is laid on obtaining a satisfactory drilling engine. Fuel economy is important as the locality in which these rigs are used has a scarcity of gas.

Biggest demand in deep cable-tool drilling has been for a satisfactory wire line. Use of the best grade of steel, improved plow, in a preformed rope has aided not only in reducing wire-line costs but in increasing the rate of penetration. A tapered line is now being used by some operators. Such a line is made up of 3,750 ft. of $\frac{7}{8}$-in. rope, 1,750 ft. of line tapering from $\frac{7}{8}$-in. to 1-in., and the balance of the line 1-in. diameter. Its advantages include better tool action, less weight and bulk on the shaft and increased life.

## Hard Facing of Tool Joints

There are more than 10,000 hard-faced tool joints of all types in service at the present time. Some of these joints were hard-faced when new, but in the great majority of cases hard facing has been carried on in connection with building up worn joints. Important to the drilling industry is the fact that this work can be accomplished at the rig, thereby eliminating the necessity of transporting the pipe from the field to the shop.

Equipment shortages of the present crisis have served to enhance the importance of hard facing. In no case on record has the hard-metal application failed to double tool-joint life. In many cases the life of joints has been tripled. In order to obtain the best possible service from hard facing, the following general rules are offered. These should be followed in applying the hard metal:

1. Any joint that is to be hard-faced should be preheated to approximately 300° F., or enough to take the chill out of the steel.

2. Before hard-facing worn tool joints, it is advisable to weld the joints to the pipe with mild-steel electrodes.

3. A copper form helps to obtain a square elevator shoulder, but copper forms should not be used when electric-tube borium is being applied.

4. Welding should progress from the top of the joint down, and not from the bottom up.

5. When applying coated self-hardening metal, use as much heat as possible.

6. Do not hard-face both the pin and the box. On integral-joint drill pipe, hard-face the pin ends; on all other types of tool joint, hard-face the boxes.

On integral joints it is common practice to put beads of self-hardening metal 1½ in. wide around the pipe, leaving between these two beads a 3 to 4-in. band to be covered by horizontal high-carbon beads. The facing should never be less than ⅛-in. thick, since thinner coatings tend to undercut. Most concerns have found that a deposit of self-hardening metal 2½ in. wide on the box of tool joints of types other than the integral-joint design provides ample protection against wear. Some firms, however, prefer to follow the same procedure that is used for rebuilding integral-joint drill pipe.

da para la circulación invertida es la Snivie. Un niple de 18 pulgadas con tres perforaciones de $\frac{7}{8}$ a una pulgada se coloca inmediatamente arriba de la barrena. Un émbolo con tazas de válvula opuestas, se coloca en la tubería y se corre hacia abajo hasta que se meta en la barrena, cerrando aquí la circulación y obligando a todo el flúido a salir por las perforaciones contra las paredes del agujero. Este método se usa para lavar la cara de arena. Para recobrar el émbolo, la circulación se establece por la tubería de revestimiento y sale por la tubería o cañería.

## Perforación profunda con herramientas de cable

Las herramientas de cable usadas para la perforación profunda están siguiendo el mismo estilo que se ha establecido para los aparejos giratorios de perforación a profundidades medianas. Todas se están mecanizando y unificando y se está dando particular atención a la obtención de un satisfactorio motor para la perforación. La economía en combustible es importante, pues la localidad en que estas máquinas trabajan es, por lo general, muy pobre en gas.

La mayor demanda en el campo de la perforación profunda con herramientas de cable se presenta en satisfactorio cable de alambre. El uso de la mejor clase de acero, arado mejorado en un cable de alambre preformado ha ayuda no sólo a reducir los gastos de cable de alambre, sino también a aumentar la rapidez de la penetración. En muchos casos se están usando un cable escalonado. Este cable consta de 3.750 piés de cable de $\frac{7}{8}$ pulgada, 1.750 piés de cable que se agranda de $\frac{7}{8}$ a una pulgada, y el resto de una pulgada de diámetro. La ventaja de semejante cable es mejor acción de herramienta, menos peso y bulto y mayor duración efectiva.

## Revestimiento duro de las uniones para herramientas

Hay más de 10.000 uniones con revestimiento duro de todo tipo en servicio al presente. Algunas de estas uniones para herramientas recibieron revestimiento duro cuando nuevas, pero en la mayor parte de los casos, el revestimiento duro ha sido aplicado en conexión con la rehabilitación de los uniones desgastadas. Importante para la industria perforadora es el hecho de que este trabajo puede hacerse en el aparejo o torre de perforación, eliminándose así la necesidad de transportar el tubo del campo al taller.

La carestía de equipo en la presente crísis ha servido para acentuar la importancia del revestimiento duro. No se registra todavía el caso en que la aplicación de revestimiento duro haya dejado de aumentar al doble la duración de la unión para herramientas. En muchos casos, la duración de las uniones para herramientas se ha triplicado. Para obtener el mejor servicio posible del revestimiento duro, se recomienda seguir las siguientes reglas generales, en conexión con la aplicación del metal duro.

1. La unión por recibir revestimiento duro debe calentarse previamente a como 300 grados F. o una temperatura suficiente para quitarle el temple al acero.

2. Antes de aplicar revestimiento duro a uniones desgastadas, es bueno soldar las uniones al tubo con electrodos de acero dulce.

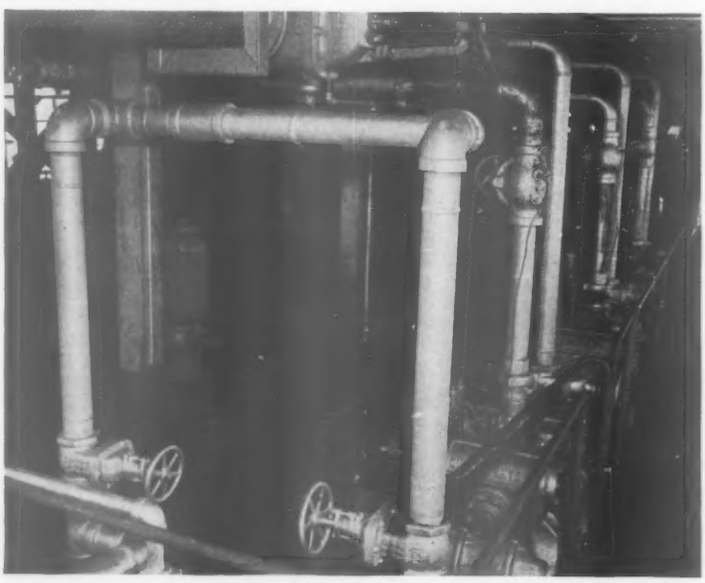
3. Una forma de cobre ayuda a obtener reborde rectangular, pero las formas de cobre no deben usarse cuando se está aplicando borio de tubo eléctrico.

4. La soldadura debe progresar de arriba a abajo de la unión, y no de abajo hacia arriba.

5. Al aplicar capas de metal de endurecimiento automático, deberá usarse tanto calor como sea posible.

6. No debe aplicarse revestimiento duro al vástago y caja. En tubo de perforación con unión integral, aplíquese revestimiento duro a los extremos del vástago; en todos los demás tipos de uniones para herramientas, el revestimiento duro deberá aplicarse a las cajas.

En las uniones integrales, es práctica corriente aplicar rebordes de metal de endurecimiento automático de 1½ pulgadas de ancho alrededor del tubo, dejando entre estos dos rebordes una banda de 3 a 4 pulgadas para cubrirse con rebordes horizontales de alto contenido de carbono. El revestimiento nunca deberá tener menos de 1/8 pulgada de espesor, pues las capas más delgadas tienden a cortarse. Casi todas las firmas han visto que un depósito de metal de endurecimiento automático de 2½ pulgadas de ancho en la caja de las uniones para herramientas que no sean del tipo integral, provee amplia protección contra el desgaste. Algunas firmas sin embargo, prefieren seguir el mismo procedimiento que se recomienda para la reconstrucción de tubo de perforación de unión integral.



*Pump room on a drilling job where circulation of the fluid and quality of the mud were of extreme importance. Three 20-in. pumps were used in this case*

*Sala de bombas en un trabajo de perforación, en el que la circulación del líquido y la calidad del lodo eran de suma importancia. En este caso se emplearon tres bombas de 20 pulgadas*

*106 years of experience in the pioneering of improved instruments for the measurement and control of* **GAS, OIL, STEAM AND LIQUIDS**

GENERAL OFFICES • 60 EAST 42ND STREET, NEW YORK, N. Y.

# AMERICAN METER COMPANY

INCORPORATED (ESTABLISHED 1836)

*Trade Names:* AMERICAN . . . Mc DONALD
METRIC . . . PACIFIC . . . RELIANCE
TUFTS . . . WESTCOTT

## PRODUCTS:

METERS: Demand, Displacement (Gas or Air), Flowmeters, Indicating, Integrating, LP-Gas, Recording, Laboratory, Orifice, Oxygen, Wet and Dry Test, Wide Range Orifice, etc. INDEXES: Base Pressure, Base Volume. CONTROLLERS: Flow, Liquid Level, Pressure, Rate and Volume, Remote Control. GAGES: Differential, Volume and Pressure. REGULATORS: Automatic Gas Cut-Off, Back Pressure, Balanced Valve, LP-Gas, Gas and Air Pressure, High Pressure, etc. TESTING AND PROVING APPARATUS.

Front view of Office Meter

Vista de lantera del contador de orificio

### ORIFICE METERS AND FLOWMETERS

Indicating, Recording and Integrating types. The Integrating Orifice Meter gives a totalized reading of the quantity which has passed through the orifice for all flow rates and pressure variations.

### NEW SYLPHON-ACTUATED ORIFICE METER

A spring loaded bellows replaces the usual mercury manometer. It is designed for installations where fluids are measured, and where it is inadvisable to use mercury.

### RATE-VOLUME CONTROL

Controllers that dependably maintain the flow rate of gases or liquids at a predetermined maximum value by automatically controlling the differential produced by the rate of flow through an orifice. Also Proportional and Liquid Level Controls.

### REMOTE RECORDER AND CONTROLLER

Newly developed for the improved transmission, recording and control of pressures, liquid levels and flow rates of orifice-measured gas, air, steam or fluid—over any distance.

### POSITIVE DISPLACEMENT METERS

Including a full line of "Ironcase" meters for general industrial use in the measurement of all gases. Unsurpassed accuracy and ruggedness. The body is molded in one piece.

### GAS AND AIR REGULATORS

A complete range of high and low pressure types—including the new Combination Balanced Valve. Noted for ease of servicing as well as close control.

Round Case Indicating Flowmeters.

Contadores de corriente "flowmeters", de indicación con caja redonda.

Segmental Dial
Cuadrante segmentario.

Round Dial (at right)
Cuadrante redondo.

## PRODUCTOS

CONTADORES: de demanda, de desplazamiento (para gas o aire) de corriente, de indicación, integrante o totalizador, de registro, de laboratorio, de orificio, de oxígeno, de ensayo líquido y seco, de orificio de gran alcance, etc. INDICES: de presión básico, de volúmen básico, de demonstración, etc. GOBIERNOS O CONTROLES: de corriente, de nival líquido, de presión, de velocidad y cantidad, de gobierno a distancia. MANOMETROS: diferenciales, de volúmen y presión. REGULADORFS: de cierre automático de gas, de contrapresión, de válvula de compensación, de gas embotellado, de presión de gas y aire, de alta presión, etc. APARATOS DE ENSAYOS Y PRUEBAS. VALVULAS, etc.

Sending and Receiving Units of Air-Actuated Remote Recorder and Controller.

Grupos de transmisión y recepción de registrador a distancia y control actuados por aire.

### CONTADORES DE ORIFICIO Y FLOWMETERS DE CORRIENTE

En tipos de indicación, de registro e integrantes o totalizadores. El contador de orificio de tipo integrante acusa la cantidad total que ha pasado por el orificio a todo régimen de corriente y en toda variación de presión.

### NUEVO CONTADOR DE ORIFICIO ACTUADO POR SILFÓN

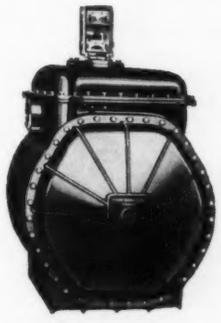
Un fuelle accionado por resorte se usa en lugar del manómetro corriente de mercurio. Está proyectado para instalaciones en que se miden los líquidos y para aquellas en que no es conveniente el uso del mercurio.

### CONTROL O GOBIERNO DE VELOCIDAD Y VOLUMEN

Estos controles o gobiernos mantienen, con seguridad, el régimen de velocidad de los gases o líquidos, a un valor máximo predeterminado, regulando automaticamente el diferencial producido por la velocidad de la corriente que pasa por un orificio. También, controles proporcionales y de nivel líquido.

### REGISTRO Y CONTROL A DISTANCIA

Un instrumento recientemente perfeccionado para la mejor transmisión, registro y gobierno de las presiones, niveles líquidos y regimen de velocidad de gas, aire, vapor y líquidos medidos en el orificio—a cualquier distancia.



Ironcase Meter with Base Pressure Index.

Contador en caja de hierro, destapado.

### CONTADORES DE DESPLAZAMIENTO POSITIVO

Se ofrecen en un completo surtido de modelos "Ironcase" para uso industrial general, en conexión con la medición de toda clase de gases. Exactitud irreprochable. Duración extraordinaria. El cuerpo está moldeado en una solo pieza.

### REGULADORES DE GAS Y AIRE

Un completo surtido de tipos de alta y de baja presión, incluyenda la nueva válvula de compensación de combinación. Notables por la facilidad de su conservación y también por la exactitud de su gobierno.

New CBV Regulator
Nuevo regulador CBV

# Trends in Production Practices

# Tendencias en Practicas de Produccion

WITHIN a period of a few months, care of equipment in the producing fields has become the chief concern of the operating oil company. A year ago, equipment care was of minor importance; but today, with shortages having developed in almost every type of oil-field equipment and raw material, the very continuance of production may be dependent upon the life of equipment.

The program for production of war materials during the coming year calls for more raw supplies than are now being produced, and upon this basis the oil producer must prepare for the possibility of long-continued shortage.

With this outlook, much of the progress of the past months has been toward better maintenance. Advancements made in this field on the whole have not taken final shape as yet. The problem is intensified by the fact that protective materials such as paints, are often hard to get.

One tendency that is becoming notable is the practice of making minor changes in surface pumping equipment to save wear and tear on sucker-rod strings. This is being accomplished through use of air-cushion or rubber shock absorbers, through better alignment of equipment, or through use of longer strokes with fewer reversals per minute. In some cases where the length of stroke cannot be materially increased with the equipment in use, less production is accepted (as a result of reducing the number of strokes) rather than to run the risk of shortening sucker-rod life.

A good example of the consideration now given to equipment life can be seen in the Midway-Sunset field of California. Here a major company is replacing 180 old-style single-cylinder gas engines with small electric motors. The program, which is about half complete, calls for using the same rig fronts, but these are driven by 3 to 5-hp. a.c. motors using purchased power. The pumping stocks have been lengthened so that fewer strokes are necessary to get the production. The small motors, exerting a constant force without impulses, result in a flattening of peak loads. The motors lend themselves readily to accurate regulation so that the pumping rate can be selected that will meet the need for reduced sucker-rod wear.

## Liner Cleaning

In the fields of the Gulf Coast and California where wells are equipped with liners to prevent caving of the oil formation, one of the first essentials for satisfactory production is a clean liner. The past year saw development of a new liner cleaner. The washing fluid is pumped down from the surface, emerging from the washing tool at a point between two opposed swab rubbers about 1 ft. apart so that the entire flow of fluid can be forced through a selected interval of the liner. A recording pressure gage at the surface shows how much pressure is required to force fluid through any given set of perforations, thereby showing when the liner has been sufficiently cleaned, and also providing a check on the setting of the liner's perforated sections. The method is applicable to perforated, slotted, or prepacked gravel liners.

The liner washer described above is used while the liner is being installed. The fluid circulated through the perforations passes around the top of the liner and thence to the surface. A delayed-action liner hanger is used so that the washing can take place before the packer is set.

A method was recently devised making it possible to run the liner on the tubing string. Following the landing of the liner, the bottom of the hole is washed out, the well is washed in by circulating oil or gas around the bottom of the liner, the packer at the top of the liner is expanded inside of the casing shoe, the christmas tree is installed, and the tubing is hung in final position, all without killing the well or removing the tubing from the hole. Since the well under this process is brought in through the casing with the flow of oil and gas emerging around the outside of the liner, a chance is afforded for cleaning the

DENTRO de un período de pocos meses, el cuidado del equipo en los campos de producción se ha hecho la consideración más importante de las empresas explotadores. Hasta hace un año, el cuidado del equipo era de menor importancia; pero, hoy, con la escasez que se presenta de casi todo tipo equipo de campo petrolífero y materias primas, la misma continuación de la producción está dependiente de la duración del equipo. El programa de producción de materiales de guerra durante el próximo año exige más materiales que los que se están produciendo, y sobre esta base, el productor de petróleo debe prepararse para enfrentar la posibilidad de una escasez prolongada indefinidamente. En vista de esta situación, gran parte del progreso de estos últimos meses ha sido en el sentido de mejor conservación. Los avances hechos en este campo, en general, no han asumido todavía una forma final. El problema se complica con la dificultad que se presenta, a menudo, en la obtención de materiales protectivos, como pinturas, por ejemplo.

Una tendencia, que se está haciendo notable, es la práctica de hacer cambios menores en el equipo de bombas exteriores para evitar el desgaste y destrucción de las varillas de bomba. Esto se está realizando mediante el uso de amortiguadores de aire o de caucho, mejor alineación del equipo o por medio del empleo de carreras más largas con menos inversiones por minuto. En algunos casos, donde la longitud de la carrera no puede aumentarse mucho con el equipo presente, se acepta menor producción (como resultado de la reducción del número de carreras) en lugar de tomar el riesgo de acortar la duración de las varillas de bomba.

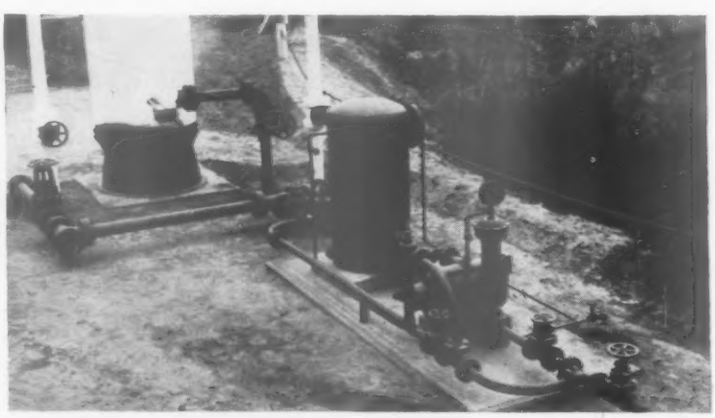
Un buen ejemplo de la cuidadosa consideración que se está dando a la duración del equipo se presenta en el campo Midway-Sunset de California. Aquí, una importante compañía está reemplazando 180 motores monocilíndricos de gas, de estilo antiguo, con pequeños motores eléctricos. El programa, que está casi la mitad terminado, comprende el uso de iguales aparejos de perforación, pero todos han de accionarse con motores de 3 a 5 cdf. que funcionen con fuerza comprada de afuera. Las carreras de las bombas se han aumentado, de modo que se requieran menos carreras para una producción dada. Los motores pequeños, ejerciendo una fuerza constante sin impulsos, tienen el efecto de evitar sobrecargas. Estos motores se prestan a exacta regulación, de modo que la rapidez de la succión puede regularse de acuerdo con la necesidad de reducir el desgaste de las varillas de bomba.

## Limpieza de los forros

En los campos de la Costa del Golfo y de California, donde los pozos están equipados con forros, para evitar el hundimiento de la formación petrolífera, el uso de un forro limpio es uno de los requisitos más esenciales para asegurar una producción satisfactoria. El año pasado presenció el desarrollo de un nuevo limpiador de forro. El líquido de lavado se inyecta desde ha superficie, saliendo por la herramienta de lavado en un punto que queda entre dos empaquetaduras de caucho opuestas, a una distancia de como un pié, de modo que toda la corriente de líquido puede forzarse por un intervalo elegido del forro. Un manómetro de presión, en la superficie, acusa la cantidad de presión que se necesita para hacer el líquido por un grupo dado de perforaciones, y de esta manera se sabe cuando ha recibido suficiente limpieza el forro, y esto sirve también para verificar la colocación de las secciones perforadas del forro. El método presente puede aplicarse a forros perforados, ranurados o previamente empacados.

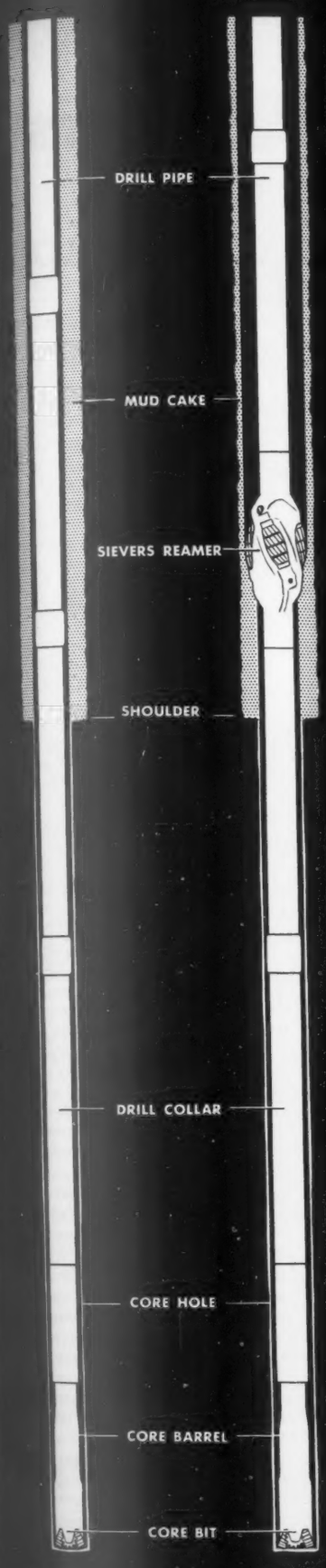
El limpiador de forro descrito arriba se usa mientras se está instalando el forro. El flúido que circula por las perforaciones pasa por arriba de la parte superior del forro y de aquí sube a la superficie. Se usa un soporte de forro de acción retardada, para que el lavado se efectúe antes de colocar el tapón.

Recientemente se descubrió un método que hace posible correr el forro en la serie de tubos. A con-



*A recent development has been the use of meters for gaging the production from individual wells. Here a positive-displacement meter is connected with a small tank for added gas separation. The gas bypasses the meter. Note the ice on separator, caused by gas expansion.*

*Un reciente desarrollo ha sido el uso de indicadores para registrar la producción de los pozos individuales. Aquí mostramos un contador de desplazamiento positivo conectado a un tanque pequeño para adicional separación de gas. El gas pasa en derivación por el contador. Obsérvese el hielo en el separador, causado por la dilatación del gas.*




# THE SIEVERS REAMER

## Improves Core Recovery, Reduces Mud Cake, Saves Reconditioning Time

In coring operations, the core hole is generally drilled ahead several hundred feet with a small diameter core bit before it is enlarged to full size.

The double-sized hole thus produced often causes difficulties. The tendency of mud to cake on the walls of the large hole has, in several instances, been so severe that the entire lower part of the hole has been lost. More frequently, the mud deposit chokes back the diameter of the large hole to the approximate diameter of the core hole (as illustrated at far left) necessitating an extra reaming operation which can be easily avoided . . .

THE SOLUTION: Run a Sievers Reamer in the drill string so that it keeps the large hole reamed to full size. Each time the core barrel is brought out, the reamer is simply moved up the string a short distance to keep it above the small diameter core hole. This application has definite advantages listed below . . . . .

## Mejora la recuperación de núcleos, reduce la acumulación de lodo, ahorra tiempo en la rehabilitación

Para trabajo se sacar núcleos, el agujero del núcleo se perfora generalmente varios centenares de pies adelante, con una barrena de diámetro pequeño, antes de ser agrandado a tamaño completo.

El agujero de doble tamaño que se produce así causa, a menudo, dificultades. La tendencia del lodo a acumularse y endurecerse en las paredes del agujero grande es, en muchos casos, tan severa, que la completa parte inferior del agujero se ha perdido. Con mayor frecuencia, el depósito de lodo obtura el diámetro del agujero grande reduciéndolo aproximadamente al diámetro del agujero del núcleo (como se ilustra al extremo izquierdo) lo que impone la necesidad de una adicional operación de escariación, cosa que puede evitarse facilmente . . .

LA SOLUCION: Corra un escariador Sievers en la tubería de perforación, de modo que mantenga escariado a tamaño completo el agujero grande. Cada vez que el cañón o cilindro del sacanúcleos se saque, el escariador sencillamente se levanta una corta distancia para mantenerlo arriba del agujero pequeño del núcleo. Esta aplicación tiene varias ventajas . . .

1. It prevents excessive mud cake from forming, keeping the large hole to its full diameter at all times.

2. It eliminates the possibility of choking core hole with sloughed mud—which often causes the bit to drill off into the walls, losing the original footage as well as starting a new hole.

3. It reduces excessive vibration and stabilizes the drill string above the core barrel.

4. It speeds up drilling time by eliminating the need for reconditioning the hole at frequent intervals.

5. It reduces the chance of sloughed mud and cavings sticking the pipe or bridging the hole at the shoulder.

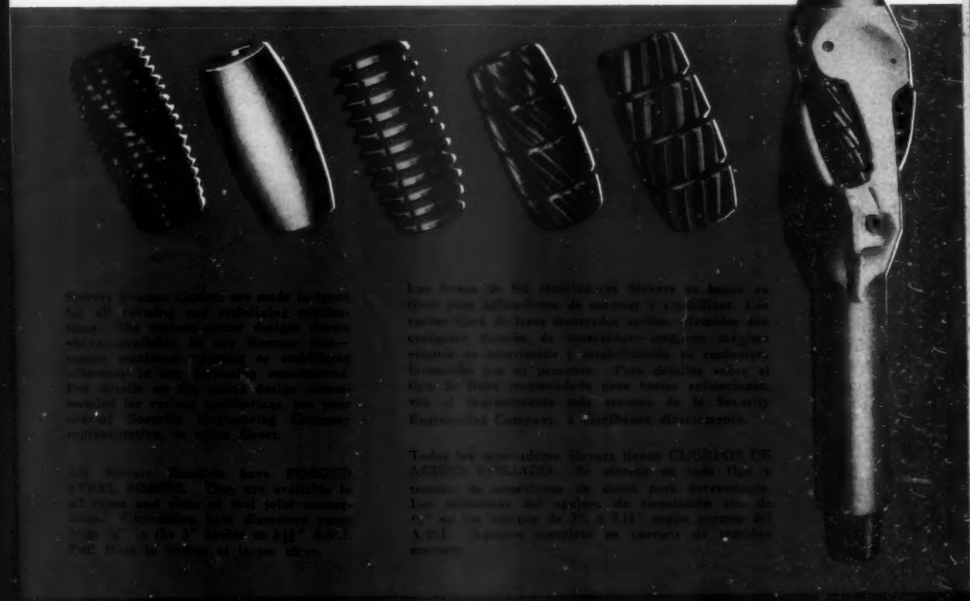
1. Impide la formación de excesivo depósito de lodo, conservando el agujero grande a su diámetro completo durante todo el tiempo.

2. Evita la posibilidad de obturar el agujero del núcleo con lodo retenido—lo cual a menudo produce agradamiento y desgarre de las paredes durante la perforación, con pérdida de distancia y peligro de empezar un agujero nuevo.

3. Reduce la vibración excesiva y estabiliza la línea de perforación arriba del cilindro o cañón del sacanúculeo.

4. Acelera el tiempo de la perforación eliminando la necesidad de reparar el agujero a frecuentes intervalos.

5. Reduce la posibilidad de que el lodo y otros materiales claven el tubo o tapen el agujero en el reborde.



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*Sievers Reamers ★ Securaloy ★ Security Drillable Products*

sand face thoroughly before the production is forced to pass through the liner.

Under continued production, liners tend to clog up with sand, silt, shale, and with cementing material carried by encroaching waters. Use of explosives for opening up slots appears to be meeting with considerable success. First work of this kind was carried out with gas bombs. The principle is to create inside of the liner a low-velocity concussion wave that will have sufficient force to flush the slots and the surrounding formation without breaking or distorting the liner. The gas torpedo is loaded with an explosive mixture of methane and oxygen, is lowered into the liner on a sand line, and is detonated by a go-devil dropped from the surface to strike a firing mechanism. The methane is put into the bomb at a shop, but the oxygen, which brings the pressure up to 500 lb. is introduced after the bomb has been lowered into the casing. Three-inch tubing is used for the bomb, and this is grooved to release the gas at a rather low pressure on explosion, but it will remain in one piece while it is being taken from the well.

The most recent work on the use of explosives for liner cleaning has been accomplished with a fuse-like explosive, similar to the Cordeau-Bickford fuse used to set off dynamite and other explosives in mining work. Experiments on the surface have shown that this explosive will dislodge cementing material composed of litharge and glycerin, one of the most durable of cements, from liner slots. With one or two applications, there was no noticeable change in slot measurements, but after a number of explosions, a widening of the slots was perceptible.

## Gravel Packing

Present emphasis in the gravel packing of liners is upon proper placement of the gravel. It has been recognized that careful selection of gravel of the proper size will be to no avail if the placement job does not result in a tightly packed envelop of gravel completely surrounding the perforated pipe. Failure to cover the liner properly in just one place may prevent the remainder of the gravel pack from accomplishing its purpose.

Several years ago a rule was worked out from a theoretical and practical point of view for the proper selection of gravel size by C. J. Coberly. This rule calls for use of gravel eight times the size of the sand at the 10-percentile point on the cumulative screen analysis. Use of this rule has been successful, as gravel so selected has greatly decreased sand production and is believed to have increased oil production. If the oil sand is unconsolidated, however, a small amount of fine sand will continually filter through a gravel pack selected on this basis. This flour sand may not cause any lifting problems, but it is, nevertheless, likely to be deposited progressively in the gravel, where its presence will tend to restrict the flow of oil through the pack. Thus the question has arisen as to whether or not a gravel size should be selected that will stop as much of the sand as possible at the contact between sand face and gravel pack. Such a gravel would be finer than that specified by the 10-percentile rule.

Prepacked liners must be of such

*An air-operated tubing tong on a well-servicing job.*

*Una garra de tubo accionada por aire comprimido en un trabajo de reparación de pozo.*

diameter that they can be run in through the casing, and therefore minimum thickness for successful screening becomes an important consideration. Tests recently made by Kenneth E. Hill* indicate that any thickness of gravel pack which is less than three diameters of the gravel size being used will be ineffective. For best results a pack thickness of not less than 5-grain diameters should be used, and this should be well packed with grains of nearly uniform size. It was found that a ⅛-in. gravel pack was quite successful in an extensive series of experiments for all gravel sizes smaller than four-mesh.

A study of wells in the Wilmington, California, field has revealed that the gravel-packed and prepacked-liner wells show greater production rates than do the conventionally completed wells. This, however, does not clearly establish their greater productivity because the wells are prorated and are not ordinarily allowed to produce at maximum capacity even on potential

*(Continued on Page 209)*

*Hill, Kenneth E., "Factor Affecting Use of Gravel in Oil Wells," presented before midyear A.P.I. meeting, May 1941.

tinuación de la colocación del forro, el fondo del agujero se limpia bien, el pozo se lava por la circulación de petróleo o gas alrededor del fondo del forro, el tapón arriba del forro se ensancha dentro de la zapatá de la tubería, se instala el christmas tree y la tubería se cuelga en posición final, todo sin tapar el pozo o extraer la tubería del agujero. Como el pozo, bajo este procedimiento, brota por la tubería, con la corriente de petróleo y gas saliendo por la parte de afuerza del forro, se presenta entonces una oportunidad para limpiar la cara de arena de una manera completa antes de que la producción sea obligada a pasar por el forro.

Bajo contínua producción, los forros tienden a taparse con arena, cieno, esquisto o con material de cemento llevado por las aguas brotantes. El uso de explosivos para abrir ranuras parece que está teniendo mucho éxito. El primer trabajo de este caracter se hizo con bombas de gas. El principio es crear dentro del forro una onda de concusión de baja velocidad, que tenga fuerza suficiente para llenar las ranuras y la formación adyacente sin deformar o romper el forro. El torpedo o bomba de gas se carga con una mezcla explosiva de metano y oxígeno, y se baja hasta el forro por el cable de la bomba de arena, detonándose con un go-devil, el cual, lanzado desde la superficie, caè sobre un mecanismo disparador. El metano se carga en la bomba en un taller, pero el oxígeno, que levanta la presión a 500 libras, se introduce después de que la bomba se ha bajado en la tubería. Para la bomba o torpedo se emplea un tubo de tres pulgadas. Este se ranura, para dejar salir el gas a una presión algo baja, al detonarse, pero el tubo quedar sin romperse, en una sola pieza, mientras se quita del pozo.

El más reciente trabajo en el uso de explosivos para la limpieza de forros se ha hecho con un explosivo semejante a un fusible, similar la fusible Cordeau-Bickford usado para detonar dinamita y otros explosivos en trabajos de minería. Los experimentos en lasuperficie han mostrado que este explosivo puede desalojar material de cementación compuesto de litargirio y glicerina, uno de los cementos más durables, de las ranuras del forro. Con una o dos aplicaciones, no hubo visible cambio en las dimensiones de las ranuras, pero después de un número considerable de explosiones se observó un ensanchamiento de las ranuras.

## Empaquetadura de grava

En la empaquetadura grava de los forros se da actualmente énfasis a la colocación correcta de la grava. Se ha visto que la cuidadosa selección de la grava de correcto tamaño no es suficiente si el trabajo de colocación no resulta en una cubierta bien apretada de grava alrededor del tubo perforado. Cuando se deja de cubrir bien el forro en un solo punto, esto podrá impedir que la empaquetadura de grava haga bien su trabajo.

Hace varios años se estableció una regla fundada sobre un punto de vista teórico y práctico, para la correcta selección del tamaño de la grava, por C. J. Coberly. Esta regla recomienda el uso de grava que sea 8 veces el tamaño de la arena al punto de 10 porciento del análisis acumulativo del colador. El uso de esta regla ha tenido éxito, pues la grava así elegida, ha reducido grandemente la producción de arena y se cree que ha aumentado la producción de petróleo. Sin embargo, si la arena de petróleo no está consolidad, una pequeña cantidad de arena fina se filtrará continuamente por la empaquetadura de grava elegida sobre esta base. Esta arena fina no podrá causar ningún problema de levantamiento, pero está propensa a depositarse progresivamente en la grava, donde su presencia tendrá finalmente la tendencia a restringir la corriente de petróleo por la empaquetadura. Por esta razón, se suscita le pregunta de si ha de elegirse un tamaño de grava que pueda parar lo más que se pueda de la arena en el contacto entre la cara de arena y la empaquetadura de grava. En tal caso, semejante grava podría o debería ser más fina que la especificada por la regla del 10 porciento.

Los forros previamente empacados deben ser de tal diámetro que puedan pasar por la tubería de revestimiento, y por esta razón, el espesor mínimo, para la correcta filtración, es una consideración muy importante. Los ensayos recientemente hechos por Kenneth E. Hill* indican que cualquier espesor de empaquetadura de grava que sea menos de tres diámetros del tamaño de grava que se usa, resultará inefectivo. Para los mejores resultados, deberá usarse un espesor de empaquetadura de no menos de cinco diámetros de grano y esto debe empacarse bien con granos de tamaño casi uniforme. Se vió que una empaquetadura de grava de ½ pulgada dió buenos resultados en una extensa serie de experimentos con todos los tamaños de grava menores de cuatro puntos.

Un estudio de los pozos en el campo de Wilmington, California, ha revelado que los pozos con empaquetaduras de grava y forros previamente empacados, muestran una mayor rapidez de producción que los completados de la manera corriente. Esto, sin embargo, no establece claramente su mayor productividad, porque los pozos están prorreateados y no se les permite producir a máxima capacidad aun para los fines de ensayos de potencial. Los datos sencillamente indican que los pozos con empaquetadura de grava pueden producir a regimenes más próximos a su capacidad, sin efecto detrimental, o que cuando se restringen por un tapón de un tamaño dado, pueden producir más petróleo que sus vecinos.

*(Continue en Pagina 209)*

*Kenneth E. Hill, "Factor que afecta al uso de grava en pozos de petroleo"—presentado ante la reunion de la A.P.I. en mayo de 1941.

# WHELAND

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| CARACTERISTICAS MAXIMAS CON LOS MANGUITOS MAS GRANDES | | | | |
|---|---|---|---|---|
| BOMBA NO. | Diámetro int. de cil. y carrera de émbolo | R.P.M. | Galones por minuto | LIBRAS DE PRESION |
| HP-8000 | 7 x 12 | 60 | 460 | 700 |
| HP-11000AB | 7¼ x 14 | 50 | 476 | 900 |
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De necesitarse mayores presiones, se emplean manguitos y émbolos más pequeños, los cuales ofrecemos para todas las bombas.

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The new HP-8000 is not "just another pump"; it is an important addition to the Wheland line and a significant development for the oil industry.

All Wheland Power Pumps are tested to 3000 pounds in discharge ports; 1500 pounds in suction.

| MAXIMUM SPECIFICATIONS WITH LARGEST LINER | | | | |
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| PUMP NO. | Bore & Stroke | R. P. M. | G. P. M. | POUNDS PRESSURE |
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| HP-11000AB | 7¼ x 14 | 50 | 476 | 900 |
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If higher pressures are required use smaller liners and pistons which are available for all pumps.

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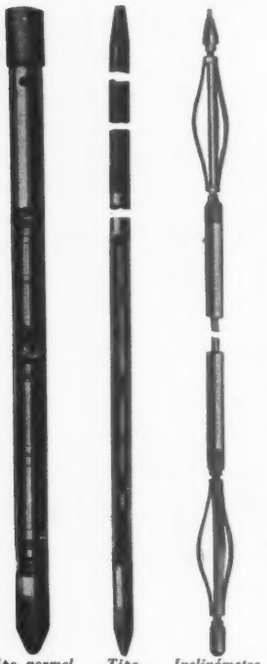
# THE WHELAND COMPANY

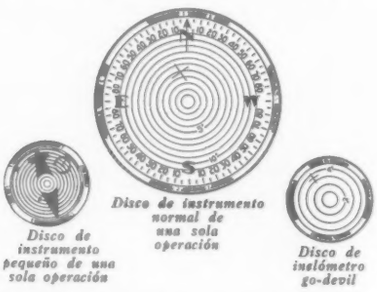
ROTARY DRILLING EQUIPMENT

*Chattanooga, Tenn.*

# INSTRUMENTOS LANE-WELLS PARA EL RECONOCIMIENTO DE POZOS DE PETROLEO



*Tipo normal de una sola operación* — *Tipo pequeño de una sola operación* — *Inclinómetro go-devil*



*Disco de instrumento pequeño de una sola operación* — *Disco de instrumento normal de una sola operación* — *Disco de inclinómetro go-devil*

Lane-Wells ofrece para uso en campos de petróleo tres instrumentos que sirven para determinar la inclinación, dirección o ambas cosas, durante la perforación de pozos. Estos instrumentos son manejados por los trabajadores de la compañía petrolera y están construidos de modo que pueden usarse y leerse los resultados sin necesidad de conocimientos matemáticos complicados. Se pueden hacer reconocimientos completos y exactos de los pozos mediante la anotación sistemática de la inclinación y dirección acusada por estos instrumentos de una sola operación.

### EL INSTRUMENTO NORMAL DE RECONOCIMIENTO DE REGISTRO FOTOGRAFICO, TIPO MAGNETICO DE UNA SOLA OPERACION

Este instrumento se corre en el pozo con el cable de la bomba, tubo de perforación o tubería, para obtener un registro fotográfico permanente de la inclinación y dirección del agujero sin revestimiento a cualquiera profundidad y en cualquier momento. Provee un medio de registrar la extensión y la dirección de las desviaciones, durante la perforación del pozo, y es esencial para el gobierno de la perforación direccional. Los registros que suministra son sencillos y fáciles de leer, y quedan disponibles para uso práctico cinco minutos después de sacado el instrumento del agujero. Se suministra completo con instrucciones para el trabajo—carga, descarga y desarrollo del disco.

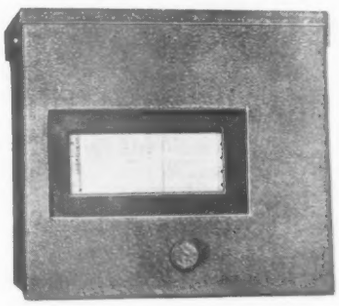
### PEQUENO INSTRUMENTO DE REGISTRO FOTOGRAFICO TIPO MAGNETICO DE UNA SOLA OPERACION

Este aparato consiste en un instrumento de reconocimiento de diámetro pequeño y liviano en peso, que se baja en un pozo en una caja exterior no magnética. Suministra un registro exacto y permanente de la inclinación y dirección del agujero sin revestimiento y se emplea mucho para el gobierno de pozos bajo perforación. El mismo personal de la compañía petrolera puede manejar bien el instrumento, el cual, debido a su tamaño pequeño, puede bajarse por el tubo de perforación. Las acusaciones se prestan a fácil lectura y quedan disponibles dentro de cinco minutos después de sacado el instrumento del pozo. No se requiere conocimiento de matemáticas o fotografía para su manejo y lectura. Se ofrecen unidades registradoras de inclinación intercambiables, para 4, 10 o 26 grados. Podemos suministrar dos tipos de cajas exteriores. El uno sirve para uso en cable de alambre en pozos a descubierto, para registrar tanto la dirección como la inclinación, o como un inclinómetro dentro de tubo de perforación de tamaños más grandes. El otro se adapta al uso con cable de alambre de equipo de retracción de sacanúcleos.

### INCLINOMETRO DE REGISTRO FOTOGRAFICO, TIPO GO-DEVIL

Este aparato se usa para medir la inclinación solamente de los pozos de perforación. Puede bajarse por el tubo de perforación, cayendo en un sujetador insertado arriba de al barrena, y correrse en el tubo de perforación en un cable de alambre, cuando se desee tomar acusaciones sin sacar el tubo de perforación y las herramientas del pozo, o bien, incorporarse a la barra del equipo sacanúcleos retractible. Está protegido en una caja exterior de acero, hermética al agua, la cual, para su caida, va equipada con guías de resorte de cuna, las cuales tienen movimiento libre para adaptarse muy bien durante su paso por las juntas para herramientas. Queda siempre en línea con el centro del tubo. El go-devil provee el mayor grado de exactitud posible, a causa de que tiene unidades de inclinación intercambiables, para medir inclinaciones hasta 4, 10 o 26 grados. El cambio de la unidad de plomo de plomada es muy sencillo. El go-devil puede manejarse por los operarios de la compañía petrolera y el registro queda disponible dentro de cinco minutos después de sacado el instrumento del agujero.

# REGISTRADOR LANE-WELLS DE TIEMPO DE PERFORACION



Lane-Wells ha perfeccionado un nuevo tipo de registrador de tiempo de perforación, sencillo en construcción y automático en funcionamiento. El tiempo de perforación queda gráficamente registrado en la forma de una tabla de profundidad, la cual puede correlacionarse inmediatamente con el tiempo de perforación, registros eléctricos o de muestras sin tener que calcular de nuevo, haciéndose sólo computaciones o tolerancias por el tiempo invertido en otros trabajos que no sean de perforación. El instrumento va dispuesto en una caja a prueba de intemperie de 10 x ½ x 6", adecuada a montaje en el aparejo de un pozo de perforación. Consta de una tabla visual de profundidad, a través de la cual se mueve una pluma a una velocidad constante, hasta que se devuelve a su posición de cero oprimiendo un gatillo, el cual avanza también la tabla a una distancia fija, de modo que las líneas de tiempo de varias longitudes quedan uniformemente separadas.

Para correlación directa con registros de perforación eléctricos, la tabla se dispone de modo que mueve 2 pulgadas por cada 100 piés de agujero perforados, o una decimo quinta parte de pulgada por pié.

La tabla está dispuesta de modo que la profundidad del agujero queda correctamente indicada en la escala de profundidad de la tabla. El mecanismo de reloj se arrolla a ¾ de la capacidad de arrollamiento del resorte, y el registrador empieza a funcionar simultaneamente con el comienzo de la perforación. El kelly se marca con intervalos de medición, dependiendo de la escala deseada. El punzón empieza a hacer la línea de tiempo de perforación a la debida profundidad en la table y corre continuamente a través de la tabla a razón de 1" cada 10 minutos, hasta que se pare. Cuando se aprieta el gatillo por el perforador para colocar el punzón en cero secundario, el resorte del reloj se arrolla automaticamente para compensar la cantidad de soltura requerida para mover el punzón de cero primario al punto de parada. La escala completa representa trienta minutos de movimiento de punzón. La columna a la derecha del registro de tiempo de perforación puede aprovecharse para anotar las profundidades, fechas y otras observaciones que convengan.

La instalación del equipo consiste en sencillamente colocar el instrumento en el aparejo de perforación, en un punto conveniente para el perforador.

Cuando el perforador tiene instrucciones de sacar muestras de todas las blandas formaciones dentro de una cierta escala de profundidad, el registro visual ante su vista le muestra graficamente la entrada de la barrena en las formaciones más blandas. La líneas de tiempo de perforación cambian en longitud de 3" por ejemplo (trienta minutos) por un pié intervalo que es lo máximo, a una fracción muy pequeña de pulgada, cuando la barrena pasa de un esquisto duro a una arena blanda.

El registro de tiempo de perforación suministra una anotación gráfica del funcionamiento de la barrena y permite al operario oportunidades para mejorar o aumentar el rendimiento de la perforación mediante la correcta elección de barrenas.

Para información completa del registrador Lane-Wells de tiempo de perforación, escriba a las oficinas principales de la Lane-Wells, 5610 South Soto Street, Los Angeles, California, E.U.A.

# PISTOLA DE PERFORACION LANE-WELLS

Las compañías de petróleo más emprendedoras en la América del Sur saben que los equipos de pistola de perforación Lane-Wells reducen los gastos de perforación, debido a que se prestan a fácil manejo por parte de los operarios de las mismas empresas petroleras. El perforador Lane-Wells permite a la empresa petrolera el uso de modernos métodos de terminación en pozos de perforación, facilitandole la obturación para la producción de zonas secundarias en pozos revestidos. Actualmente hay seis equipos de pistolas perforadoras Lane-Wells trabajando en diversos campos petrolíferos sudamericanos. Los tipos de proyectiles ofrecidos se ilustran aquí a la derecha. Están proyectados especialmente para dar penetración profunda con máxima seguridad y exactitud.

Para información completa sobre los equipos de pistolas perforadoras Lane-Wells, proyectados para usarse en la América del Sur, sírvase escribir a la Lane-Wells.

### BALAS DE PISTOLA DE PERFORACION LANE-WELLS

| NO. | TAMAÑO DE BALA | OBSERVACIONES |
|---|---|---|
| 1. | 9/16 x 1-7/16 | Penetración profunda. |
| 2. | 9/16 x 1 | Penetración profuada. |
| 3. | 15/32 x 1-7/8 | Penetración profunda. |
| 4. | 15/32 x 1-1/8 | Penetración profunda. |
| 5. | 15/32 x 1 | Penetración profunda. |
| 6. | 3/8 x 1-3/8 | Penetración profunda. |
| 7. | 3/8 x 1 | Penetración profunda. |
| 8. | 1/4 x 3/16 | Penetración profunda. |
| 9. | 1/4 x 1 | Penetración profunda. |
| 10. | 1/16 x 5/8 | Especial—Perforación de tubo. |
| 11. | 15/32 x 5/8 | Especial—Plana—Poca penetración. |
| 12. | 9/16 x 1 | Tipo hongo—Chata—Punta hueca—Para remover sección de revestimiento. |
| 13. | 9/16 x 1 | Tipo medio hongo—Punta truncada—Para romper cemento debilitado. |
| 14. | 9/14 x 1-7/8 | Tipo levemente hongo — Forma normal—Blando — Para romper el cemento detrás de la tubería. |

1 2 3 4 5 6 7 8 9 10 11 12 13 14


# UNIVERSALLY PREFERRED

# TAPONS U OBTURADORES LANE-WELLS

*Tipo de circulación B*

*Tipo de producción A*

*Tipo de pared delgada*

Como el fabricante y distribuidor más grande de tapones para petróleo y gas, la Lane-Wells construye tapones que satisfacen cumplidamente toda condición que requiera el uso de estas herramientas especiales. Los tapones Lane-Wells Quinta-Seal y los tapones Lane-Wells Olympic, en cuatro tipos básicos—para producción, circulación, pared delagada y ensayo, se ofrecen en tamaños que responden a las condiciones de trabajo que generalmente se presentan en la mayor parte de los campos petrolíferos.

Los tapones especiales, proyectados para adaptarse a condiciones extraordiarias de pozos o para satisfacer las preferencias individuales de los ingenieros, han constituido una gran parte del negocio de tapones de la Lane-Wells desde hace muchos años. Todos los tapones Lane-Wells se proyectan y fabrican para un servicio muy durable y satisfactorio.

Los tapones Lane-Wells de tipo Olympic son dotación normal en todo el mundo entre las grandes compañías ensayadoras de formaciones. Con cada tapón Lane-Wells que sale de la fábrica, va una tarjeta que contiene instrucciones completas para su uso correcto.

En los boletines sobre tapones Lane-Wells damos información detallada sobre estos productos. Pida estos boletines a nuestra oficina principal, 5610 South Soto Street, Los Angeles, California, E.U.A.

*De pared delgada, tipo CO*

*Tipo de circulación BO-C*

*Tipo de producción AO*

## TAPONES DE TIPO QUINTA-SEAL

Los tapones Lane-Wells, tipo Quinta-Seal, sobresalen por su servicio invariablemente seguro bajo todas las condiciones de pozo. Su tipo multianular los hace muy seguros, fáciles de instalar, con amplia superficie de contacto para establecer un cierre positivo y resistencia a las altas presiones de gas. Los patines de aleación de acero tratada termicamente dan una sujeción positiva sin cortar. El cuerpo de firme tubería o revestimiento sin costura tiene el mismo diámetro interior que la columna en que se corre el tapón. La superficie de circulación es bastante grande para permitir el trabajo a velocidades normales.

## TAPONES DE TIPO OLYMPIC

Los tapones Lane-Wells, tipo Olympic, se fabrican especialmente para que funcionen muy bien bajo las condiciones de trabajo más exigentes. Tienen cuatro o más anillos de lado plano para responder a las características de ensayo de formaciones. Pueden colocarse de nuevo varias veces. Los patines de tipo especial y la jaula de movimiento libre son rasgos de funcionamiento que permiten que este tipo de tapón pueda usarse muy bien en trabajo especial de corriente de gas y líquido. Estudie estos tapones con cuidado y compárelos con las especificaciones de los tapones que Vd. necesita para su propio trabajo.

## TAPONES DE CONEXION LANE-WELLS PERFORABLES

El tapón de conexión Lane-Wells perforable representa un método económico, positivo y rápido de colocar un "puente" o conexión perforable en una instalación permanente o temporaria. Provee el método más rápido y económico de tapar y ensayar un pozo, pues la obturación y la perforación con pistola se efectúa ordinariamente con una sola disposición de equipo.

El tapón tiene espacio máximo entre el tapón y el revestimiento, para permitir su bajada a su punto de una manera más rápida que los tapones de tipos antiguos.

Este tapón de conexión queda siempre fijo en el punto en que es colocado. Las presiones excesivas provenientes de arriba o de abajo tienen a apretar más aún sus patines o soportes. Bajo ensayos, este tapón se ha mantenido fijo contra presiones hasta de 8500 libras por pulgada cuadrada.

El manguito de caucho sintético es casi insensible a los efectos deteriorantes del petróleo y gas. Este manguito se ensancha automaticamente contra el revestimiento o tubería y está provisto de labios en ambos extremos, los cuales hacen que la presión del líquido o gas sprieten más el cierre.

El tapón con su correspondiente herramienta de fijación se corre en lugar de la pistola por una de nuestras unidades de servicio de perforación por pistola, o puede disponerse en tubería para lugares donde no hay cable de tipo conductor. Los dispositivos para medir y pesar de extrema exactitud que se usan en conexión con la pistola de perforación para la fijación de este tapón de conexión aseguran positivo control y precisa colocación a la profundidad deseada.

Cuando el tapón se baja a la profundidad deseada, se fija aquí para establecer un cierre absoluto. Se ofrecen tres métodos de fijación, dependiendo de la condición y locación del pozo: (1) Una pequeña carga de pólvora se detona electricamente para sacar el pasador de soltura y permitir que el ariete actuado por resortes ensanche los patines de dos direcciones para que compriman el manguito de empaque; (2) una herramienta hidráulica de fijación, que actúa sobre el principio del gato hidráulico, se emplea para la fijación del tapón; (3) en localidades donde no hay cable de conducción, el tapón y la herramienta de fijación pueden disponerse en la tubería. Se baja un go-devil para despiazar el pasador de soltura y permitir que el ariete actuado por resortes ensanche los patines y comprima el manguito. El completo gobierno en la superficie asegura 100% de seguridad durante todo el trabajo.

Como es de hierro fundido, puede perforarse con facilidad cuando sea necesario quitar el tapón, en cualquier momento.

LANE WELLS COMPANY

Fabrica y oficinas generales
Los Angeles, California

Oficinas de Exportacion
5610 South Soto Street
Los Angeles, California, U.S.A.

¡Las herramientas de Mañana Hoy!


tests. The data merely indicate either that the gravel-lined wells can be produced at rates more nearly approaching their capacity

possible to raise and lower the tubing during washing operations, two ram-type blowout preventers were installed at the tubing head. A spe-

## Control de la relación de gas y petróleo

El reductor de entrada lateral se

pletamente inadecuado, y por esta razón se obutvo un gran abastecimiento de petróleo de gas. El pozo se había completado con un forro

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## by the Petroleum Industry!

**Throughout the Western Hemisphere—from Cape Horn to Canada—petroleum producers and refiners use more instruments made by Foxboro than those of any other instrument maker. This preference is due to the time-proven dependability of the instruments . . . continuous accuracy of operation with minimum interruptions for servicing. Foxboro offers a complete line of indicating, recording and controlling instruments. Write for data on the type of instruments you need.**

**En todo el Hemisferio Occidental—del Cabo de Hornos al Canada—los productores y refinadores de petróleo usan más instrumentos construidos por la Foxboro que los fabricados por cualquiera otra firma del ramo. Esta preferencia se debe a la seguridad confirmada de los instrumentos . . . su contínua exactitud de funcionamiento con mínima interrupción para su reparación. La Foxboro ofrece un surtido completo de instrumentos de indicación, registro y regulación. Sírvase pedirnos información sobre el tipo de instrumentos que necesite.**

**TEMPERATURE INSTRUMENTS**

Foxboro Recording Potentiometer Controllers are outstanding because of their sustained accuracy in high temperature service. Also made in non-recording types. Other Foxboro Temperature Controllers, Recorders and Indicators of equally high quality are available for every operation involving heat in the petroleum industry.

**INSTRUMENTOS PARA TEMPERATURA**

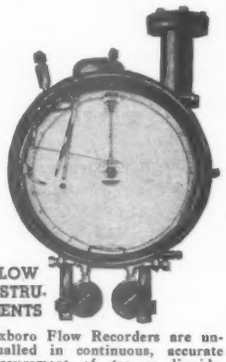
Los reguladores potenciómetros registradores Foxboro son sobresalientes debido a su contínua exactitud en servicio de alta temperatura. Se ofrecen también en tipos no registradores. Hay reguladores de temperatura, registradores e indicadores Foxboro de calidad igualmente superior para todo trabajo que comprenda calor de la industrial del petróleo.

**PRESSURE INSTRUMENTS**

Pressure can be continuuously measured or controlled with extreme accuracy by use of Foxboro Pressure Instruments. Both Recording and Non-Recording Controllers are available, Foxboro also offers a complete line of precision instruments to measure, record or control liquid level.

**INSTRUMENTOS PARA PRESION**

La presión puede medirse o regularse continuamente, con extrema exactitud, con los instrumentos de presión Foxboro. Hay reguladores registradores y no registradores. La Foxboro ofrece también un surtido completo de instrumentos de precisión para medir, registrar o regular el nivel de líquidos.



**FLOW INSTRUMENTS**

Foxboro Flow Recorders are unequalled in continuous, accurate measurement of gas or liquids. They operate accurately for years without checking. Foxboro Flow Controllers are standard for controlling flow of steam, oil and gas in refineries.

**INSTRUMENTOS PARA FLUJO**

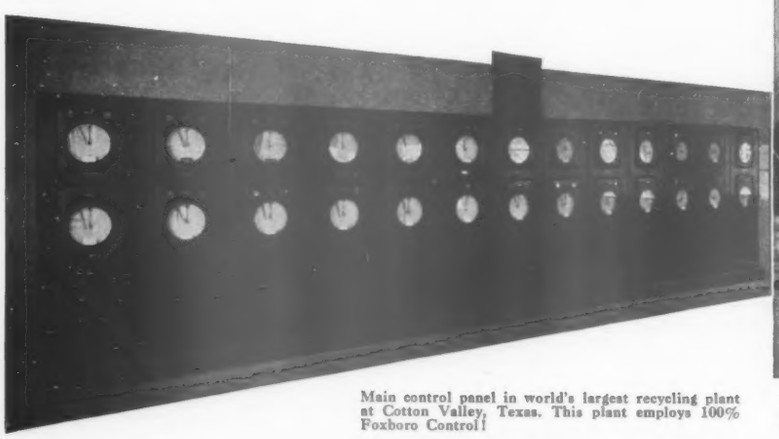
Los registradores Foxboro de flujo o corriente no tienen rival en la medición contínua y exacta de gas o líquidos. Funcionan con seguridad por años sin necesitar verificación. Los reguladores Foxboro de flujo o corriente son la norma para regular las corrientes de vapor, petróleo y gas en las refinerías de petróleo.

**STABILOG CONTROLLERS**

Foxboro developed the first stabilizing control instrument . . . the Stabilog Controller. Over 10,000 installations in the past decade have proved completely successful. The new Model 30 Stabilog Controller represents the highest refinement of stabilizing control for temperature, pressure, flow or liquid level.

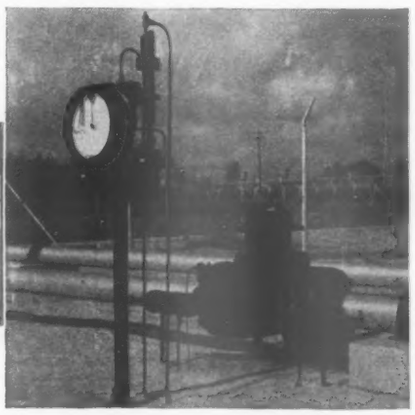
**REGULADORES STABILOG**

La Foxboro perfeccionó el primer instrumento regulador de estabilización . . . el regulador de estabilización Stabilog. Más de 10.000 instalaciones esta última década han demostrado su éxito completo. El nuevo modelo 30 de regulador Stabilog representa el refinamiento máximo en regulación de estabilización para temperatura, presión, flujo o corriente y nivel de líquido.



Main control panel in world's largest recycling plant at Cotton Valley, Texas. This plant employs 100% Foxboro Control!

Tablero principal de gobierno de la refinería más grande del mundo, en Cotton Valley, Texas, E.U.A. Todos los instrumentos empleados aquí son de marca Foxboro.



Foxboro Recorders on high pressure gas lines often serve 5 years without attention, yet remain accurate within 0.4 of 1%.

Los registradores Foxboro de líneas de tubería de alta presión, a menudo sirven 5 años sin exigir atención, permaneciendo exactos dentro de 0,4 de 1%.

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tests. The data merely indicate either that the gravel-lined wells can be produced at rates more nearly approaching their capacity without detrimental effect, or that when restricted by a given-size choke, they will produce more oil than their neighbors.

## Gas-Oil-Ratio Control

The side-inlet choke is being used very successfully for controlling the gas-oil ratios in flowing wells where the gas is mainly derived from a sand above the oil pay. In wells of this type, the gas sand is cemented off behind the casing or the liner during completion, but is opened up by several holes shot through the pipe by a gun perforator. When the tubing is run, a packer is installed with a side-inlet choke above it. The packer is set in the blank portion of the pipe just below the gun perforations. Gas entering the hole is then available above the packer, while the oil enters the tubing below the packer. The side-inlet choke then provides a means of admitting gas from the casing into the tubing at any desired rate.

The orifice of the side-inlet device is adjusted at the surface after pulling the inner cylinder with a small wire-line hoist of the type used for making subsurface tests. After adjusting the orifice, the cylinder is returned to its position in the tubing just above the packer where it seals inside of an outer cylinder by means of cups placed above and below the adjustable inlet. In this way a simple means is provided for adjusting the flowing gas-oil ratio on wells where a gas cap or separate gas sand is found.

## New Production-Restorative Process

A new method of increasing the flow of oil and gas into the well bore has proved beneficial in at least one case. A well in southern California was brought in from a depth of about 8,000 ft., but it would flow only by small heads, and these heads had to be induced by swabbing. If the producing formation had been calcareous, acid would have been used to increase the flow of oil and gas, but since the sand was practically void of acid-soluble material, no benefit of consequence could have been derived from acidizing.

It is well known to those familiar with squeeze cementing that a sand can be "opened up" by forcing clear water through it. This practice has become general as a step preceding a cement squeeze job, since "breaking down" the formation with water makes it possible to put away more slurry and also reduces the necessary pump pressures.

It was therefore reasoned that an oil sand could be opened up in like manner by resorting to a squeeze job. Water would obviously be unsuitable as the washing fluid, so a large supply of gas oil was obtained. The well had been completed with a slotted liner and a full string of 2⅛-in. tubing. In order to make it possible to raise and lower the tubing during washing operations, two ram-type blowout preventers were installed at the tubing head. A special releasable back-pressure valve was installed in the landing joint of the tubing. This device is designed so that it can be removed under pressure.

Before the oil squeeze was attempted, gas oil was pumped down the tubing to wash out the well completely. Nearly 500 bbl. of gas oil was circulated at a rapid rate before the returns, emerging from the 7-in. tubing, were considered sufficiently clear. At this point the casing was closed and a pressure of 900 lb. was built up while 45 bbl. of gas oil were being forced out into the oil zone. The amount of strata exposed in the hole was 246 ft., much of which consisted of shale.

After completing the washing and squeezing operation, the well was swabbed in the tubing for nearly 12 hours. During this swabbing the casing pressure built up to 500 lb., and flow through the tubing started against a back pressure of 140 lb. The well was found capable of flowing, unaided, a production of 100 bbl. per day of 31°-gravity oil through a 10/64-in. surface choke, which was a notable improvement over the initial flow.

It can be expected that additional use of the oil-squeeze restorative process on an experimental basis will be a development of the near future. It is possible that the process will some time take its place alongside acid treating and well shooting as a comparable measure applicable to a different type of oil-producing formation. One engineer recently suggested in a technical paper that casing-head gasoline should be used in this manner, forcing it into wells to break the water block about the walls of the hole. In this way, it was claimed, water deposited from the drilling mud or water deposited by encroachment about the well bore could be driven back into the sand to open free passages for movement of oil into the well.

In the example described above, pressures necessary to force the gas oil into the formation were not extremely high. The pressure could be applied merely by closing the casing with the hole full of gas oil and pumping additional gas oil down the tubing. Where higher pressures are required, a cement retainer would avoid the necessity of subjecting the casing to pressure.

## Well-Servicing Derricks

Portable wheel-mounted masts or derricks have long been used for servicing shallow wells, thereby avoiding the necessity of a permanent derrick over each hole. More recently portable derricks have been mounted on trucks together with a hoist and other equipment necessary for pulling wells. Until the last year, however, equipment of this kind was considered suitable for shallow or medium-depth wells only.

*(Continued on Page 212)*

## Control de la relación de gas y petróleo

El reductor de entrada lateral se está empleando con éxito para regular las relaciones de gas y petróleo en los pozos brotantes, donde el gas se deriva principalmente de la arena arriba de la sección productiva de petróleo. En los pozos de este tipo, la arena del gas se cementa detrás del revestimiento o del forro durante la terminación, pero se abre por varios agujeros hechos a través del tubo por una pistola perforadora. Cuando se baja la tubería, se instala un tapón con un obturador de salida lateral colocado encima de este último. El tapón se coloca en la porción lisa del tubo, debaja de las perforaciones. El gas que entra en el agujero pasa por arriba del tapón, mientras el petróleo entra a la tubería por debajo del tapón. El obturador con entrada lateral provee así un medio de admisión de gas del revestimiento a la tubería a cualquier régimen que se desee.

El orificio del obturador con entrada lateral se ajusta en la superficie después de tirar el cilindro interior con un pequeño malacate de cable de alambre del tipo que se usa para pruebas o ensayos subterráneas. Después de ajustar el orificio, el cilindro regresa a su posición en la tubería, quedando encima del tapón, donde se cierra dentro de un cilindro exterior, por medio de tazas colocadas arriba y abajo de la entrada ajustable. De este modo, se provee un medio sencillo para ajustar la corriente de gas y petróleo en pozos en que hay una acumulación separada de arena de gas.

## Nuevo procedimiento restaurativo de producción

Un nuevo método de aumentar el paso del petróleo y gas al agujero del pozo ha resultado beneficioso por lo menos en un caso. Un pozo en California del Sur se hizo brotar a una profundidad de como 8.000 piés, pero producía en cantidad muy pequeña y necesitaba limpiarse con frecuencia. Si la formación productiva hubiera sido calcárea, podría haberse empleado ácido para aumentar la corriente de petróleo y gas, pero como la arena estaba casi desprovista de material soluble en ácido, este procedimiento no habría tenido ninguna consecuencia beneficiosa.

Los que están al corriente de la cementación comprimida saben que la arena puede abrirse haciendo pasar agua por ella. Esta práctica se ha generalizado como un paso preliminar a un trabajo de cementación comprimida, pues la separación de la formación con agua hace posible reducir las necesarias presiones de bomba.

Por esta razón, se creyó posible que una area petrolífera podría también abrirse del igual manera, recurriendo a un trabajo de compresión. El agua, en este caso, resultaría como líquido de lavado, completamente inadecuado, y por esta razón se obutvo un gran abastecimiento de petróleo de gas. El pozo se había completado con un forro perforado y una serie completa de tubería de 2½ pulgadas. Para hacer posible subir y bajar la tubería durante las operaciones de lavado, se instalaron dos apartos para evitar los incendios en la cabeza de la tubería. En la unión de soporte de la tubería se instaló una válvula de contrapresión especial. Esta válvula está dispuesta de modo que puede quitarse bajo presión.

Antes de aplicarse la presión de petróleo, se introdujo, por bomba, petróleo de gas, para lavar bien el pozo. Cerca de 500 barriles de petróleo de gas se circularon a un rápido régimen, antes de que el regreso salido por la tubería de 7 pulgadas se considerara suficientemente claro. A este punto, la tubería fué cerrada y se desarrolló una presión de 900 libras mientras se inyectó un total de 45 barriles de petróleo de gas por la zona petrolífera. La cantidad de estrata expuesta en el agujero era de 246 pies y gran parte de ella consistía en esquisto.

Después de completar el lavado y la operación de compresión, el pozo fué limpiado en la tubería por cerca de 12 horas. Durante esta limpieza, la presión en la tubería se desarrolló hasta 500 libras y la corriente por la tubería empezó contra una contrapresión de 140 libras. Se vió que el pozo podía dar, sin ayuda, una producción e 100 barriles por dia, de petróleo de 31 grados de pso específico, a través de un obturador superficial de 10/64 pulgada, lo cual fué un mejoramiento notable sobre la producción inicial.

Se puede anticipar que el adicional uso del procedimiento restaurativo por presión de petróleo, sobre una base experimental, será un desarrollo en tiempo futuro. Es posible que el procedimiento llegará a ocupar un puesto al lado del tratamiento con ácido y dinamitación del pozo, como una medida comparable, que podrá aplicarse a diferente tipo de formación productiva de petróleo. Un ingeniero sugerió recientemente, en un artículo técnico, que la esencia de gasolina podría usarse de esta manera, inyectándola en los pozos para separar el bloque de agua alrededor de las paredes del agujero. De esta manera, se dice, el agua depositada del lodo de perforación o el agua depositada por acumulación próxima al agujero del pozo, podría meterse en la arena para abrir conductos despejados para el movimiento de petróleo al pozo.

En el ejemplo descrito arriba, las presiones necesarias para inyectar el petróleo de gas en la formación no fueron extremadamente atlas. La presión podía aplicarse sencillamente tapando o cerrando la tubería con el agujero repleto de petróleo de gas e inyectando petróleo de gas en la tubería. Donde se requieren mayores presiones, un retenedor de cemento evitaría la ne-

*(Continue en Pagina 212)*

Fig. 511

Fig. 516

Fig. 505

Fig. 517

# SPANG

# CABLE TOOLS

SPANG AND COMPANY
Butler, Pa., U. S. A.

Fig. 526

Fig. 618

Fig. 654

Fig. 671

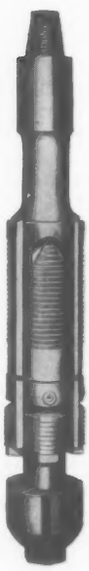


Fig. 693-A

Fig. 677

Fig. 683

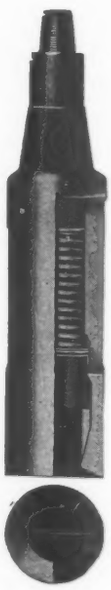


Fig. 620

Fig. 706

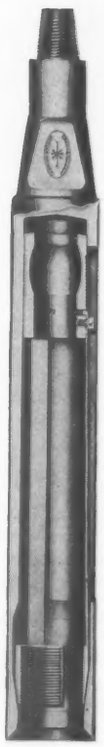


Fig. 626

Fig. 524

**Fig. 511**—Spang Weldless Drilling and Fishing Jars . . . forged from one piece of alloy steel.

**Fig. 516 & 517**—Heat-Treated Pin and Box for Stems and Sinkers.

**Fig. 505**—Prosser-Type Swivel Rope Socket.

**Fig. 526**—Standard-Type Straight-Blade, All-Steel Drilling Bit, with heat-treated pins.

**Fig. 524**—Spang-Type Drilling Bit, Twisted Blade . . . most effective drilling bit available, for all formations. Insures straighter holes, lessens caving.

**Fig. 618**—Spang Patented Alligator Grab.

**Fig. 654**—Manila-Rope or Wire-Line Grab, made with either 2 or 3 prongs.

**Fig. 671**—Spang Eclipse Up-Cutting Wire-Line Knife.

**Fig. 693-A**—Trip-Casing Spear . . . made in 2, 3 and 4 Slip Types.

**Fig. 677**—Improved-Type Casing Cutter.

**Fig. 683**—Spang Patented Reversible Splitter or Ripper.

**Fig. 620**—Combination Socket.

**Fig. 706**—Combination Trap Slip Socket, for fishing tubing and rods.

**Fig. 626**—Full-Circle Three-Slip Socket.

For more than 40 years, Spang Drilling and Fishing Tools have been universally recognized as "Higher Standard" Cable Tools. Their reliability and economy have been proved in the drilling of thousands of the most difficult wells. Today, Spang and Company are the largest exclusive manufacturers of Cable Tools in the world. The Spang line includes the various tools required for all Cable Drilling conditions and for general lease maintenance. Catalog on request.

**Fig. 511**—Recipientes sin soldadura Spang de perforación y de pesca, forjados de especial aleación de acero de una sola pieza.

**Fig. 516 & 517**—Espiga y cojinete tratados térmicamente para vástago by dispositivos forzadores.

**Fig. 505**—Manguito de cable giratorio tipo Prosser.

**Fig. 526**—Barrena de perforación de tipo Spang, de lámina recta normal, con espigas tratadas termicamente.

**Fig. 524**—Barrena de perforación de tipo Spang, de lámina en espiral. La broca o barrena más eficaz en el mercado, para todas las formaciones. Asegura agujeros más rectos y reduce los hundimientos.

**Fig. 618**—Atrapador Alligator Spang patentado.

**Fig. 654**—Atrapador en cable metálico o de Manila, con 2 o con 3 puntas.

**Fig. 671**—Cuchilla Eclipse Spang para cortar cable metálico de abajo para rriba.

**Fig. 693-A**—Harpón de disparo de revestimiento, provisto en tipos de 2, 3 o 4 sujetadores.

**Fig. 677**—Fresa de revestimiento de tipo perfeccionado.

**Fig. 683**—Seccionador o rompedor reversible Spang patentado.

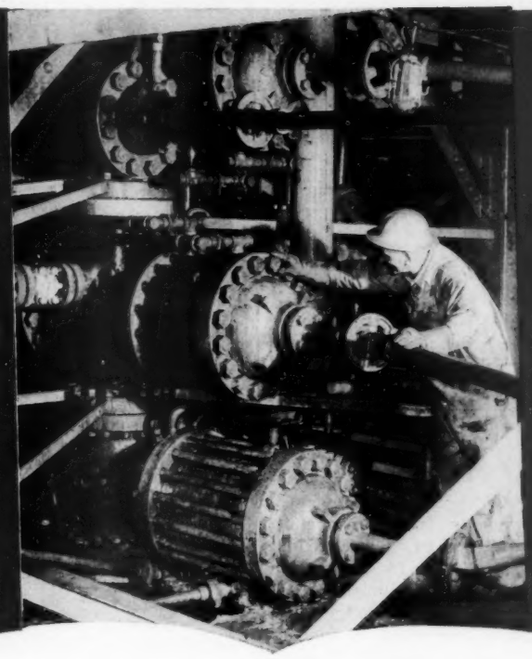
**Fig. 620**—Manguito de combinación.

**Fig. 706**—Manguito de combinación de sujetador y trampa, para pesar la tubería y varillaje.

**Fig. 626**—Manguito de tres sujetadores a círculo completo.

Desde hace más de 40 años, las herramientas Spang de perforación y pesca se conocen universalmente como las herramientas de cable "de norma superior". Han demonstrado su eficacia en seguridad y en economía, en la perforación de millares de pozos de difícil tratamiento. Hoy día, la Spang & Company es la fábrica exclusiva más grande del mundo de herramientas de cable. El surtido Spang comprende todas las herramientas que se requieren para las condiciones más variadas de perforación por cable y de mantenimiento general de explotaciones. Catálog a solicitud.

# BRING ON YOUR PRESSURES!



# PÓNGANOS SU PRESIÓN

Now, as never before, when oil and defense are so closely allied, you need the world's surest protection against blowouts . . . to conserve oil, gas, and reservoir pressures and to prevent the destruction of costly drilling machinery. *Cameron Pressure-Operated Drilling Control Units provide that protection.*

These and numerous other features have made Cameron Blowout Preventers and Master Gate Valves the standard of comparison the world over:

*Instant Closure* — Pressure supplied by boiler feed pump, slush pump, or both, remotely controlled from the derrick floor, closes rams and ram gate instantly. (Manually operated units also available, if desired.)

*Positive Seal*—Patented self-feeding packing elements in blowout preventer rams effect a positive seal the instant closing pressure is applied. Ample reserve of resilient packing material permits rotating and moving pipe in hole safely under pressure. Self-feeding packing element in valve ram gate automatically feeds out and effects a pressure-tight seal even though the seat should be roughened, corroded or sand cut.

*Pipe Centered Automatically*—Heavy angular wing guides made integral with blowout preventer rams automatically center pipe in hole and totally eliminate danger of rams being held open.

*Well Cuttings Cannot Prevent Closure*—Cylindrical rams eliminate any shelves or shoulders on which cuttings may accumulate.

Complete details will gladly be furnished interested operators on request.

Ahora como nunca, cuando el Petróleo y la Defensa Nacional están tan estrechamente relacionadas, Ud. necesita la protección más segura en al mundo contra erupciones a fin de conservar el petróleo y gas, y la presión del yacimiento, así como también evita la destrucción de costosas maquinarias de perforación. *La unidad "Cameron" de control, operada a presión le dará a Ud. esa protección.* Esta y otras condiciones han hecho del "blow-out preventer" y de la válvula "Master Gate Cameron" un "standard" de comparación para todo el mundo:

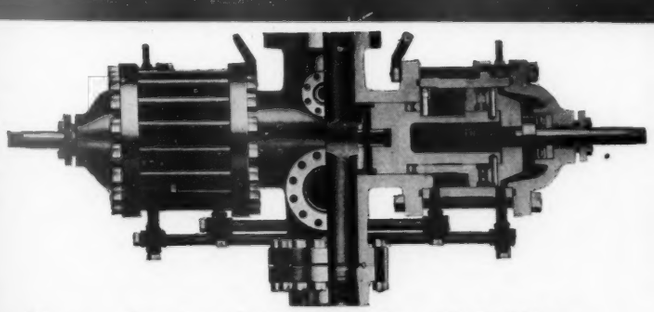
*Cierres Instantáneos*—La presión de la bomba de alimentación de las calderas o de la bomba de inyección, o de ambas, controladas a la distancia desde la Torre, permite cerrar instantántemente las compuertas empaquetadoras y de cierre total. También se proveen unidades de operación manual.

*Cierre Positivo*—El dispositivo de empaquetamiento "Self-Feeding" patentado para las compuertas de los "blow-out preventers" realiza un cierre positivo desde el instante enque es aplicada la presión.

Su amplia reserva de material flexible de empaquetamiento permite rotar y mover el sondeo en el pozo bajo presión con toda seguridad. El elemento de empaquetamiento "Self-Feeding" de las compuertas de la válvula "Master Gate" se alimenta automáticamente y logra un sellamiento eficaz a pesar de que el asiento esté dañado, corroido, o cortado por la arena.

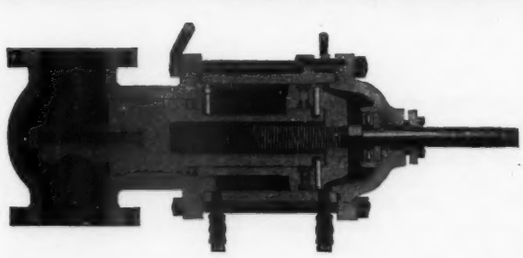
*Centrimiento automático del sondeo.*

Las fuertes aletas guías angulares de que están dotadas las compuertas del "blow-out preventer" centran automáticamente el sondeo en el pozo y eliminan el peligro de que las compuertas queden semiabiertas. El detritus no puedo entorpecer el cierre pues las compuertas cilíndricas eliminan todo recordo donde pudiera acumularse el detritus. Gustosamente suministraremos detalles completos a los operadores interesados.



Cross-section view of a Cameron, Type SDA, 6000 lbs. Test Pressure-Operated Blowout Preventer.

Sección travesada de un "blow-out Preventer" operado a presión "Cameron," tipo SDA, 6000 libras de presión de prueba.



Cross-section view of Cameron, Type DV, 6000 lb. Test Pressure-Operated Gate Valve.

Sección travesada de una válvula "Master Gate Cameron," tipo DV, 6000 libras de presión de prueba operada a presión.

**CAMERON IRON WORKS, INC.**

Houston, Texas

Export: 74 Trinity Place, New York, N. Y.

Deeper wells were able to use truck-mounted hoists in conjunction with permanent derricks.

Derrick-carrying well-servicing units have now gone into service that are capable of performing rod-and-tubing jobs on the deepest pumping wells in the world. Where road laws will permit, these machines are capable of covering a large area, servicing wells of all depths without the aid of permanent derricks or other surface equipment. The largest of these units is capable of handling 10,000 ft. of 2½-in. tubing and racking it in its derrick. The folding derrick and the hoist are mounted on a 28-ton, six-wheel all-wheel-drive truck.

Complete wheel-mounted servicing units for deep wells have made it possible to extend a practice formerly used only on shallow wells. When wells are completed, the drilling derrick can be skidded with its equipment intact to the next location. If the well flows, the low allowables will probably assure a long period before the pumping stage. In this case it is believed that by the time the pumping stage eventuates, there will be truck-mounted derrick-carrying servicing units in every area where a company's holdings justify their maintenance.

## Power Tubing Tong

In order to speed up assembling of the tubing string and to achieve uniform makeup at all joints, some tubing crews now use power tongs. The power tong has self-engaging jaws mounted within a large circular gear which has an open throat to permit insertion over the pipe. This main gear is operated by two drive gears which are so placed that one will always be engaged while the other is over the cutaway portion of the main gear. These two drive gears are powered by a fourth gear, and this in turn is connected to the crank shaft of a radial-type pneumatic engine, which is mounted on what would normally be the handle of the tong. Compressed air is used to operate the engine. On truck-mounted well-servicing units, the air compressor which feeds the pneumatic engine is permanently mounted on the truck bed. The power tong is hung in the derrick, using counterbalances.

## Inspection of Tubing and Rods

Detection of defects in tubing and rods has avoided many pulling jobs during the past year. Inspection has now become one of the major duties of the modern well-servicing crew. Worn places inside of tubing strings, such as those brought about by sucker-rod abrasion in crooked holes, can be detected and measured by an instrument which is drawn through the string. The instrument comprises a bundle of fingers which are forced outward against the tubing walls. When a finger enters a groove or hole, its base makes contact with a ring, and this contact is recorded at the surface. The contact ring is adjustable so that in a series of runs the approximate depth of all groves and pits can be determined. Bad joints discovered in this manner are replaced, and maximum service can be obtained from the remainder of the string without excessive expense.

Inspection of tubing threads usually includes the use of a special brushing device which is inserted over the threads and then removed by turning so that the bristles will follow the threads to remove all foreign material. In some cases where tubing threads have become badly worn, battered, or fluid cut after numerous pulling jobs, the threads have been cut off so that the joints could be rethreaded by special portable equipment in the field.

One of the most unusual of the new instruments is the magnetic tester for fatigue in sucker rods. Metallurgical changes in sucker-rod steel, it has long been known, influence the magnetic characteristics. Making use of this principle, an instrument has been designed for use at the well head. The well-head unit contains a coil through which the sucker rods are drawn. A small amount of electric current is supplied to the coil from a motor-generator set mounted in a light truck, using explosionproof equipment where the current is great enough to start a fire. Recording of the magnetic value takes place on a chart in the truck. Intended primarily to avoid fatigue breaks while the rods are in use, the instrument

*(Continued on Page 217)*

*Portable platform used during well servicing and cleaning-out operations at California locations where the derrick floor has been removed. The men are able to work at a convenient height above the Christmas tree.*

*Plataforma portátil usada durante los trabajos de reparación y limpieza en ciertos pozos en California donde se ha quitado el piso de la torre o aparejo. Los hombres pueden trabajar a una conveniente altura encima del christmas tree.*

cesidad de someter la tubería a presión.

## Aparejos para servicio de pozos

Los mástiles o aparejos o torres portátiles, montados en ruedas, desde hace tiempo se han usado para pozos de poca profundidad, evitándose así la necesidad de una torre permanente sobre cada agujero. Más recientemente, las torres o aparejos de perforación se han montado en camiones, conjuntamente con un malacate y otros equipos necesarios para la perforación del pozo. Hasta el año pasado, sin embargo, el equipo de esta clase se considerable adecuado para pozos de poca y de regular profundidad solamente. Los pozos más profundos podían usar malacates montados en camión en combinación con torres de instalación permanente.

Ahora han entrado en servicio torres portátiles de servicio que se prestan al trabajo de tubería hasta en los pozos más profundos del mundo. Donde los reglamentos camineros lo permiten, estas máquinas son capaces de cubrir grandes zonas, trabajando en pozos de cualquiera profundidad, sin la ayuda de torres o de otros equipos exteriores de instalación permanente. El equipo más grande de esta clase tiene capacidad para manejar hasta 10.000 piés de tubería de 2½ pulgadas con su torre. La torre plegadiza y el malacate van montados en un camión de 28 toneladas de 6 ruedas, con propulsión a todas las ruedas.

Los equipos completos, montados en ruedas, para pozos profundos, han hecho posible extender una práctica que anteriormente se aplicabla sólo a los pozos de poca profundidad. Cuando se completan los pozos, la torre de perforación puede transportarse intacta con todo su equipo al siguiente punto de trabajo. Si el pozo brota, los reglamentos legales de limitación asegurarán probablmente un largo período de explotación antes de que se requiera la etapa de bomba. En este caso se cree que para el tiempo en que se presente la etapa de bomba, habrá un aparejo o torre montada en camión, con todos los elementos de servicio, en cada zona donde las propiedades de una compañia justifiquen su mantención.

## Garras de fuerza mecánica para tubería

Para acelerar el montaje de la tubería y obtener una disposición uniforme de todas las uniones, los trabajadores, en ciertos campos, se valen ahora de garras accionadas por fuerza mecánica. La garra mecánica tiene mandíbulas de movimiento automátic dentro de un engranaje circular grande, el cual tiene una garganta abierta para permitir su inserción por el tubo. Este engranaje principal está actuado por dos engranajes propulsores, los cuales están colocados de modo que uno siempre quedará enganchado mientras el otro está sobre la porción recortada del engranaje principal. Estos dos engranajes de propulsión reciben fuerza de un cuarto engranaje, y este último, a su turno, está conectado al cigüeñal de un motor neumático, de tipo radial, montado en lo que normalmente sería el mango de la garra o sujetador. Para el funcionamiento del motor se emplea aire comprimido. En los equipos montados en camión, para servicio de pozos, el compresor de aire que se utiliza para la alimentación del motor neumático, está permanentemente montado en el camión. La garra mecánica se cuelga en la torre y se usan contrapesos.

## Inspección de tubería y varillas

El descubrimiento de defectos en la tubería y varillas ha evitado muchos trabajos de extracción el año pasado. La inspección se ha hecho ahora uno de los principales deberes de la cuadrilla encargada de servir a los pozos. Los puntos desgastados dentro de las tuberías, como aquellos que se producen por el rozamiento de las varillas en agujeros ladeados, pueden ahora descubrirse y medirse con la ayuda de un instrumento que se pasa por la misma tubería. El instrumento comprende un grupo de dedos que se proyectan hacia afuera tocando la pared de la tubería. Cuando un dedo entra en una ranura o agujero, su base hace contacto con un anillo, y este contacto queda registrado en la superficie. El anillo de contacto es ajustable, de modo que en una serie de pasadas se puede determinar aproximadamente la profundidad de todas las ranuras y hoyos. Las uniones en mal estado, descubiertas de esta manera, pueden reemplazarse y del resto de la tubería se obtendrá servicio máximo sin gasto excesivo.

La inspección de las roscas de la tubería incluye generalmente el uso de un dispositivo especial, el cual se inserta en las roscas, para quitarles todo material extraño. En algunos casos, cuando las roscas de la tubería están muy desgastadas, aplastadas o cortadas, después de numerosas extracciones, las roscas se alisan y las uniones se roscan de nuevo, mediante un equipo portátil especial para este fin.

Uno de los instrumentos más extraordinarios de todos los más recientes, es el ensayador magnético de la fatiga en las varillas. Los cambios metalúrgicos en el acero de las varillas, según se sabe desde hace tiempo, ejercen influencia sobre las características magnéticas. Valiéndose de este principio, se ha perfeccionado un instrumento para uso en la cabeza del pozo. El grupo en la cabeza del pozo contiene un carrete a través del cual pasan las varillas. Una pequeña cantidad de corriente eléctrica es suministrada el carrete o bobina por un grupo motogenerador montado en un camión liviano, empleándose un equipo a prueba de explosión donde la corriente es bastante grande para producir un in-

*(Continue en Pagina 217)*

# CUT COSTS TODAY with "The Spudder of Tomorrow"

The new Bucyrus-Erie 36-L has the ability to handle drilling tools equal to 1/5 the total weight of the complete machine; handles over 5,000 lbs. of tools in shallow holes or combined weight of 6,000 lbs. to 7,000 lbs. of tools and cable in deeper holes.

Trailer mounting for haulage at truck speeds permits moving over any highway. Base of machine frame is flush and smooth on bottom to allow entire unit to be loaded on oil country truck, landed on floor of standard derrick or mounted on mud boat. Derrick and braces, which are compactly folded on top of frame when moving can be completely set up in 20 minutes.

Investigate the possibility of cutting your costs with this new Big 36-L. Write for bulletin today.

## AHORRE LOS COSTOS DE HOY DIA and *"La Perforadora Inicial de Mañana"*

El nuevo modelo Bucyrus-Erie 36-L tiene la facultad para manejar herramientas de perforación que equivalen a 1/5 del peso total de la máquina completa; maneja más de 5000 libras de herramientas en agujeros de poca profundidad o un peso combinado de 6000 a 7000 libras de herramientas y cable en agujeros más profundos.

Su instalación en remolque para el transporte a las velocidades de un camión facilita su movimiento por los caminos. La base del bastidor de la máquina queda plana y suave sobre el fondo, para facilitar la colocación de todo el grupo sobre el camión, sobre el piso de una torre normal o sobre un bote de pantano. La torre y los refuerzos se doblan o pliegan encima del bastidor, para su transporte, y pueden montarse en 20 minutos.

Estudie las posibilidades de reducir sus gastos con esta nueva perforadora inicial 36-L. Pídanos boletín ahora mismo.

BUCYRUS ERIE

Look over the 24-L. This smaller companion machine swings up to 2,500 lbs. of tools, has ample capacity to drill and swab to 2,000 ft. This smaller spudder is also of all steel welded construction in a welded trussed box frame. Derrick is 40 foot telescoping. Gasoline Diesel engine or electric power are available. Ask for the bulletin on the 24-L, too. It gives complete information on this popular all modern spudder.

Estudie el modelo 24-L. Este modelo compañero más pequeño maneja hasta 2500 libras de herramientas, y tiene amplia capacidad para perforar y limpiar hasta 2000 piés. Esta perforadora inicial más pequeña es toda de construcción de acero soldado, con bastidor reforzado y soldado. La torre de extensión tiene 40 piés. Se ofrece con motor de gasolina o Diésel o con motor eléctrico. Pídanos nuestro boletín sobre el modelo 24-L. Da completa información sobre esta moderna y popular perforadora inicial.

## BUCYRUS-ERIE COMPANY

SOUTH MILWAUKEE • WISCONSIN • U.S.A.

# 8 WAYS MacCLATCHIE EQUIPMENT ON YOUR ESSENTIAL DRILLING

## 8 MANERAS EN QUE EL EQUIPO MacCLATCHIE REDUCE LOS COSTOS DE SUS REQUISITOS ESENCIALES DE PERFORACION

## MacCLATCHIE MUD PUMP PARTS

**If you're throwing away good mud pump equipment just because certain parts of it are worn out, find out how *much* you can save on maintenance costs with MacClatchie *renewable* pump equipment. Parts of MacClatchie equipment subject to wear can be economically replaced *in the field* at only a fraction of original cost, *using non-wearing parts over and over again!***

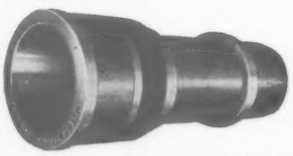
**MacClatchie Pump Equipment saves you money in two ways . . . not only with the renewable features described below, but with longer life as well. Special construction features—found in no other equipment of its type—give smoother pump operation, reduce shut-downs and lower drilling costs.**

## PIEZAS MacCLATCHIE DE BOMBAS DE LODO

**Si Vd. está abandonando un buen equipo de bomba de lodo a causa de que ciertas piezas del mismo están desgastadas, averigue *cuánto* podrá ahorrar en costo de conservación con el equipo MacClatchie renovable especial para bombas. Las piezas del equipo MacClatchie sujetas a desgaste pueden reemplazarse economicamente en el mismo *trabajo* a sólo una fracción del precio o costo original, *usando piezas no desgastables una y otra vez.***

**El equipo de bomba MacClatchie le ahorra a Vd. dinero de dos maneras . . . no sólo con las ventajas de renovación que describimos aquí, sino también con mayor duración original. Los rasgos especiales de construcción—que no se encuentran en ningún otro equipo de su clase—dan funcionamiento más suave a la bomba, reducen las paralizaciones del trabajo y bajan los costos de perforación.**

### 1 "MONEY-SAVER" PUMP LINERS



These new improved Liners save you money on replacements, shipping costs and labor. Seamless steel tube construction permits uniform wall thickness to be maintained in even the reduced sizes, greatly reducing shipping and handling weights. Uniformly heat treated and then ground to a glassy-smooth finish, these Liners have *no* soft spots to cause breakdown. Hardness tests covering *entire inner surface* assures uniform wear. When renewing "Money-Savers," the wear-free glands can be slipped off and used over again on new liners—*for you need buy only the liner itself—less gland, when renewing!* On a recent MacClatchie shipment to an export field, savings of $750.00 on shipping costs and $2000.00 on gland costs were made because of "Money-Saver" reduced weight and renewable parts!

#### FORROS DE BOMBA "MONEY-SAVER"

Estos nuevos forros perfeccionados ahorran gastos en piezas de repuesto, costo de embarque y trabajo. La construcción de acero tubular sin costura permite uniforme espesor de pared, el cual se mantiene hasta en los tamaños reducidos, con gran reducción en pesos de embarque y manejo. Uniformemente tratados al calor y luego alisados a un acabado de suavidad de vidrio, estos forros no tienen *ningún* punto débil susceptible de causar falla. Los ensayos de dureza, aplicados a la *completa superficie interior*, asegura desgaste uniforme. Al renovar los "Money-Saver", los manguitos infectados por el desgaste pueden quitarse y usarse de nuevo en los forros nuevos, pues Vd. *necesita sólo el forro mismo, sin el manguito, para la renovación.* En un reciente embarque hecho por la MacClatchie, para la exportación, se efectuaron ahorros de $750 en gastos de embarque y como $2000 en manguitos, gracias al peso reducido y piezas renovables del equipo "Money-Saver".

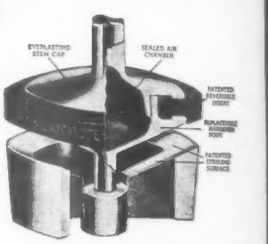
### 2 "WEAREVER" PUMP PISTONS

"Wearever" Pump Pistons can be completely renewed by simply replacing the rubbers! Just pull off the worn rubbers and put on the new ones, using the center spool and end plates over again. This puts "Wearevers" in condition for another long run, but at a cost that's often *less than half* that of new pistons. What's more, rubber replacement is accomplished quickly and easily right in the field! Recent new design and construction features prevent anything but soft steel from contacting the pump liner, thus helping prolong liner life.

#### EMBOLOS DE BOMBA "WEAREVER"

Los émbolos de bomba "Wearever" pueden renovarse por completo sencillamente reemplazando las piezas de caucho. Se quitan las piezas de caucho desgastadas y se instalan piezas nuevas, usando el carrete central y las placas laterales, de nuevo. Esto pone a los "Wearever" en condición de trabajar de nuevo por mucho tiempo, pero a un costo que a menudo es menos de la mitad del precio de los émbolos nuevos. Y más aun, pues la renovación de las piezas de caucho se efectúa fácil y rapidamente en el mismo trabajo. Recientes refinamientos en tipo y construcción permiten sólo el contacto de acero dulce con el forro de la bomba, lo que ayuda a prolongar la duración del forro.

### 3 "AIRFLOTE" PUMP VALVES

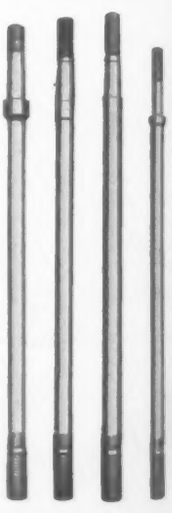



"Airflotes" have a sealed air chamber that greatly increases valve buoyancy and saves you money right from the start in less severe pounding, quicker response to changes in fluid flow and reduced valve seat wear and erosion. In addition, the patented reversible rubber inserts can be turned over when worn on one side to give *double* life, *double* savings. The everlasting stem cap can be used repeatedly and the valve body is economically replaced when worn, using the same cap. "Airflote" Valve Seats have from 20 to 100% *more* striking surface than others, reducing hammered-out spots and premature valve wear.

#### VALVULAS DE BOMBA "AIRFLOTE"

Las válvulas "Airflote" tienen una cámara de aire cerrada que aumenta grandemente la flotación de la válvula y le ahorra dinero desde el principio, con menos severidad de golpe, más rápida respuesta a los cambios en paso de líquido y menos desgaste y corrosión del asiento de la válvula. En adición, las inserciones de caucho reversibles patentadas pueden invertirse cuando se desgastan en un lado y usarse de nuevo, dando *doble duración y doble* economía. El casquillo del vástago de duración ilimitada puede usarse repetidamente, y el cuerpo de la válvula se renueva economicamente cuando se desgasta, usando el mismo casquillo. Los asientos de las válvulas "Airflote" tienen de 20 a 100% más superficie de golpe que otras, lo cual reduce los puntos debilitados por el golpeteo y evita el desgaste prematuro de la válvula.

### 4 "WEAREVER" PISTON RODS



"Wearever" Rods are made of selected alloy steel, deeply case-hardened for the ultimate in wearing life, and ground to a smooth, even finish that does not score, corrode or pit. The hard, tough and ductile core easily withstands severe pumping loads, and is amply wear-resistant to provide extra wearing surface when the hardened case finally wears away. Carefully-cut threads are heat-treated and drawn to maintain strength and eliminate chipping. "Elastic Stop Nuts", supplied instead of plain nuts if desired, are recommended because of their tight grip on the rod and elimination of fluid leakage between rod and piston. "Wearevers" are available in practically all piston tapers and in all pump sizes, fully protected against rust during transportation and storage.

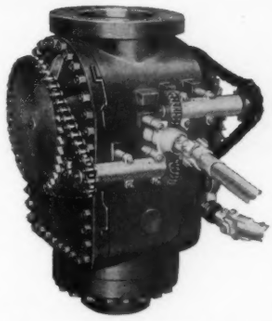
#### VASTAGOS DE EMBOLO "WEAREVER"

Los vástagos "Wearever" se hacen de especial aleación de acero, muy bien templada, para máxima duración, ye se alisan a un acabado muy suave que no raya, se corroe o pica. El núcleo duro y resistente aguanta muy bien las cargas severas de la bomba y es ampliamente resistente para proveer adicional superficie de desgaste cuando el endurecimiento superficial se desgasta. Las roscas de preciso labrado se tratan termicamente y retienen su firmeza, quedando insujetas a astillarse. Se suministran "tuercas de parada elásticas", en lugar de las tuercas sencillas, cuando así se pida. Estas tuercas se recomiendan a causa de su firme apretadura en el vástago y supresión del escape de líquido entre el vástago y el émbolo. Los vástagos "Wearever" se ofrecen en toda forma para todo tamaño de bomba, y están completamente protegidos contra el enmohecimiento durante el transporte y almacenaje.

# CUTS COSTS NEEDS.....

## 5 DRILL GATE AND PIPE PACKER

The MacClatchie Drill Gate and Pipe Packer features space-saving compactness for all cellar installations . . . exceptionally fast, positive operation . . . and low maintenance. It contains pack-offs for both drill pipe and open hole in the one housing—the top gear-operated doors packing off around drill pipe and the lower doors sealing off open hole. Thus *two* fast, positive acting controls are contained in a single tool, reducing overall height and eliminating extra flanges and threads.



### FAST OPERATION

All working parts of this MacClatchie Tool which might be subject to jamming, sanding up or clogging are eliminated from inside the body. They are all enclosed in a grease-contained exterior housing. This eliminates need for constantly washing the unit out or checking its working condition. Eight and a half turns of the wheel pack off the pipe in approximately 25 seconds, and in six turns of the wheel pack off open hole in about 10 seconds. This fast closing time is an important advantage in emergencies!

Economically-priced packing rubbers for both open hole and drill pipe gates are available for all standard pipe sizes. They can be quickly and easily changed in from one to two hours' time. Every Drill Gate and Pipe Packer is factory tested to full rated capacity.

**COMPUERTA DE PERFORACION Y TAPON DE TUBO**

La compuerta de perforación y tapón de tubo MacClatchie ofrece ahorro de espacio en todas las instalaciones de sótano . . . gran rapidez, operación positiva y bajo costo de conservación. Contiene tapones para tubo de perforación y agujero a descubierto en una sola caja—las compuertas superiores accionadas por engranajes alrededor del tubo de perforación y las compuertas inferiores cierran el agujero. De este modo se tiene *dos* controles de acción positiva contenidos en una sola herramienta, reduciéndose la altura total y eliminándose los rebordes y roscas adicionales.

**RAPIDA OPERACION**

Todas las piezas de movimiento de esta herramienta MacClatchie, que pudieran estar sujetas a trabarse, llenarse de arena u obturarse, se han eliminado del interior del cuerpo. Todas están protegidas en una caja exterior llena de grasa. Esto suprime la necesidad de constante limpieza del grupo o de periódica verificación de su condición de trabajo. Ocho y medias vueltas de rueda cierra el tubo en más o menos 25 segundos, y seis vueltas de rueda cierra el agujero en cerca de 10 segundos. Este rápido tiempo de cierre es una ventaja muy importante en caso de emergencia.

A precios económicos se ofrecen piezas de caucho de empaquetadura para compuertas de agujero a descubierto y tubo de perforación, adaptables a todos los tamaños corrientes de tubería. Pueden cambiarse con rapidez y facilidad en una o dos horas. Cada herramienta se ensaya en la fábrica al máximo de su capacidad nominal.

## 6 MacCLATCHIE Quick-Change CEMENT HEADS

MacClatchie Cement Heads are not only used for cementing casing, but are also ideal for "washing-in" casing because the Head can be inserted *while the pipe is in motion*. There are no threads to engage and no rotation is necessary, saving valuable time and preventing freezing which often occurs when the pipe is not kept moving. The Head can be installed on the casing in 30 seconds and removed in even less time. The tool is so designed that the seal tightens as pressure increases, and for this reason MacClatchie Heads have frequently been used to cap wells in an emergency. MacClatchie Heads are furnished complete as shown, in sizes which are adjustable to all weights of casing within any one size range.

**Used by every cementing company in the world!**

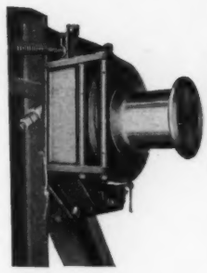
**CABEZAS DE CEMENTO MacCLATCHIE de RAPIDO CAMBIO**

Las cabezas de cemento MacClatchie se usan no sólo para cementar tubería de revestimiento, sino que son también ideales para "lavar" revestimiento, a causa de que la cabeza puede insertarse mientras el *tubo está en movimiento*. No hay roscas que conectar y no hay necesidad de rotación, lo cual ahorra valioso tiempo y evita la paralización, lo que a menudo sucede cuando no se mantiene en movimiento el tubo. La cabeza puede instalarse en el revestimiento en 30 segundos y quitarse en menos tiempo todavía. La herramienta está construida de modo que el cierre se aprieta a medida que se aumenta la presión, y por esta razón, las cabezas MacClatchie se emplean con frecuencia para cerrar pozos en casos de emergencia. Las cabezas MacClatchie se suministran completas, como se ilustran aquí, en tamaños que se ajustan a todos los pesos de revestimiento dentro de una escala de tamaño.

*Se usan por todas las compañía de cementación del mundo.*

## 7 MacCLATCHIE CATHEADS

MacClatchie manufactures two types of catheads, in models designed to meet all types of drilling operations. The Gearomatic Cathead, available in Senior, Junior and Midget Models, is designed for maximum safety at high speeds, combined with adequate strength for breaking the largest and tightest joints. It has a patented gear arrangement which causes the breaking sheave to rotate at much less the line shaft speed, yet give *from 2 to 4 times the power*, depending on the particular model's gear ratio. It is the only cathead that will work efficiently on high speed line shafts . . . some models having a gear ratio of 3½ to 1. Another important feature is that, at the end of one revolution, an automatic kick-out device releases the breaking sheave. The unit thus makes one revolution—*and only one*—per pull, yet is instantly ready for each succeeding break. All gears, bearings and other parts are of selected steel, designed for ruggedness and long life under the hardest service.



The Model DD Cathead is similar to the Gearomatic in design of its gear operated mechanism, but in addition has a powered spool operated by an extra train of planetary gears. The spool remains idle when not in use, but can be easily operated by the driller when spinning the pipe.

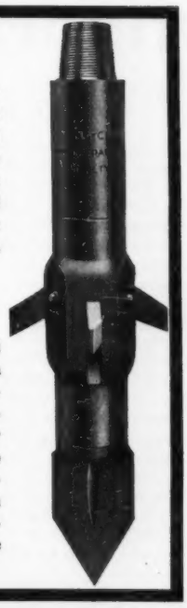
**CABRESTANTES MacCLATCHIE**

La MacClatchie fabrica dos tipos de cabrestante, en modelos que sirven para satisfacer todos los tipos de trabajo de perforación. El cabrestante Gearoamtic, ofrecida en modelos Junior y Midget, ofrece máxima seguridad a altas velocidades, combinada con adecuada firmeza para romper las juntas más grandes y apretadas. Tiene un mecanismo de engranaje patentado, que hace que la roldana de desconexión gire a mucho menor velocidad que el árbol del cable, dando, al mismo tiempo *de 2 a 4 veces más fuerza*, dependiendo de la desmultiplicación de engranajes del modelo usado. Algunos modelos tienen una desmultiplicación de engranajes de 3½ a 1. Otro rasgo importante es que al final de cada revolución, un dispositivo automático suelta la roldana. Hay, por lo tanto, *una revolución*, por empuje, y queda, al mismo tiempo, instantaneamente lista para la siguiente. Todos los engranajes, cojinetes y otras piezas son de acero muy fino, de gran firmeza y duración para resistir el servicio más pesado.

El modelo DD de cabrestante es similar al Gearomatic en tipo de mecanismo de engranaje, pero en adición, tiene un carretel accionado por fuerza mecánica, mediante un tren de engranajes satélites adicional. El carrete permanece desocupado cuando no se usa, pero puede actuarse facilmente por el perforador cuando se está girando el tubo.

## 8 MacCLATCHIE WALL SCRAPER

Three-blade design of the MacClatchie Wall Scraper gives greater strength, insures true, stabilized cutting action, reduces vibration and torsional strains on drill pipe. This tool *automatically* notifies the driller when the blades are expanded in the hole, reducing chances of mis-runs. Full circulation around each cutter and through pilot bit carries away all cuttings and insures free-cutting action. Unusually rugged construction. Available in a wide range of sizes.



**RASCADOR MacCLATCHIE DE PARED**

La construcción de tres láminas del rascador de pared MacClatchie le imparte firmeza y le asegura exacta acción estabilizada, con reducción de vibración y esfuerzos torsionales en el tubo de perforación. Esta herramienta *automáticamente* notifica al perforador cuando las láminas se dilatan en el agujero, reduciendo así la probabilidad de errores. La completa circulación alrededor de cada fresa y por la barrena guiadora se lleva todas las partículas y asegura una acción cortante expedita. De construcción extraordinariamente firme. Se ofrece en una amplia escala de tamaños.

**Write for the MacClatchie Catalog illustrating and describing these and other MacClatchie Quality Products in full detail!**

**Pida el catálogo MacClatchie en que se ilustran y describen los presentes productos y otras especialidades MacClatchie.**

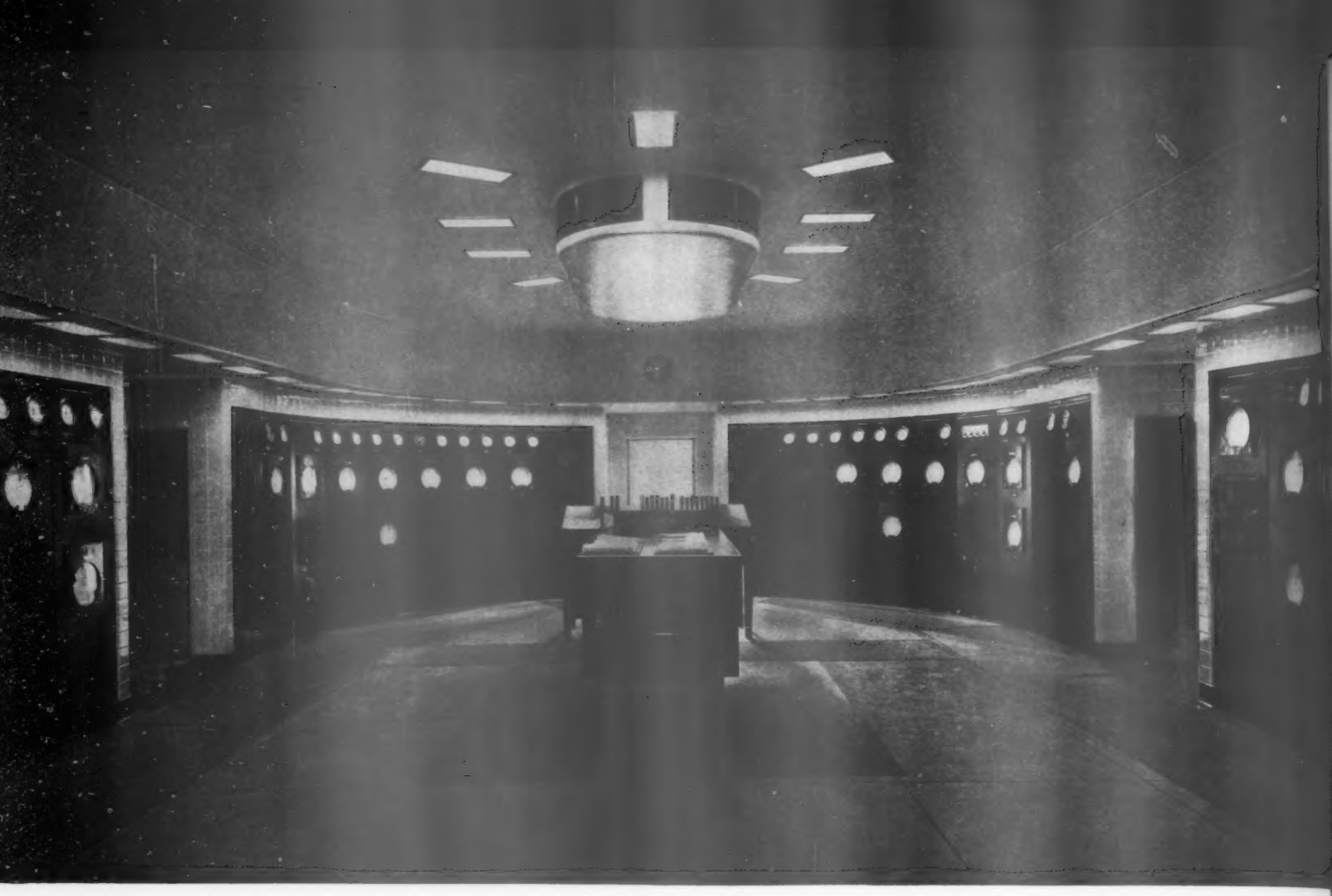
# MacCLATCHIE MANUFACTURING CO.

## COMPTON, CALIFORNIA

**Foreign: GEORGE R. WOODS, 17 Battery Place, New York City, N. Y.**

**Mid-Continent Distributor: HAKE TOOL COMPANY, Houston, Texas**

**Rocky Mountain Representative: Mountain Sales & Service, Casper, Wyoming**



# Importantes Ayudas a la Fraccionacion

## *En la separación de fracciones dentro de limitada escala de ebullición*

En la manufactura de combustibles de motor de alto número octano, una gran parte del producto refinado está compuesta de hidrocarburos puros obtenidos por la fraccionación de mezclas comprendidas dentro de limitada escala de ebullición. La separación de semejantes mezclas en componentes relativamente puros requiere una medición precisa de la temperatura, presión y flujo o corriente, además de una coordinación completa de todas las fases de gobierno.

En la aplicación de instrumentos de indicación, registro y regulación a los grupos de alcalización y de otros procedimientos similares, podrá Vd. confiar siempre en la precisión y seguridad de los reguladores Brown. Hay un instrumento Brown para cada fase del trabajo relaciónado con estas modernas instalaciones.

LAS TEMPERATURAS DE LA TORRE se mantienen dentro de límites exactos mediante los nuevos controles potenciómetros Brown de gráfico circular.

LAS PRESIONES DE LA TORRE se regulan con exactitud con los controles de presión Brown de elemento en espiral.

EL REGIMEN DE ALIMENTACIÓN, DE REFLUJO y de otros servicios similares, se miden y regulan con precisión con los contadores de flujo Brown.

LOS NIVELES LIQUIDOS en calderas, torres y tanques se controlan con los versátiles reguladores de nivel líquido Brown de tipo diferencial.

Los instrumentos Brown pueden agruparse en un tablero central de distribución, por medio de sistemas de transmisión a distancia eléctricos o neumáticos, o combinación de ambos, para establecer control o gobierno completo de todas las operaciones desde el tablero principal de control.

Cuando se equipan con los mecanismos de control neumático Brown Air-o-Line, ofrecen la última palabra en precisión y adaptabilidad, asegurando al dueño un servicio exento de irregularidades bajo las condiciones más exigentes.

Hemos impreso un boletín técnico muy detallado, que se refiere exclusivamente a los problemas especiales que se presentan en los instrumentos y gobierno de las columnas de destilación que funcionan dentro de limitadas escalas de ebullición. Todos los problemas relativos al gobierno o control automático de estas instalaciones se explican aquí en detalle y el texto está muy bien ilustrado con diagramas de circulación o flujo. Este boletín es de suma importancia para los ingenieros, refinadores y constructores. Pídanos un ejemplar.

THE BROWN INSTRUMENT COMPANY, 4488 Wayne Avenue, Filadelfia, Pa., E.U.A. Oficinas sucursales en las principales ciudades. Amsterdam-C, Holanda: Wijdesteeg 4—Inglaterra: Wadsworth Road, Perivale, Middlesex—Estocolmo, Suecia: Nybrokajen 7.

**Pídanos nuestro boletín 26-40**

Para temperaturas • presiones • flujos • niveles líquidos

# BROWN INSTRUMENTS

THE BROWN INSTRUMENT COMPANY, PHILADELPHIA, PENNSYLVANIA
DIVISION OF MINNEAPOLIS-HONEYWELL REGULATOR CO.
MINNEAPOLIS, MINNESOTA, AND 119 PETER STREET, TORONTO, CANADA

*Medir y regular es economizar.*

will also reveal flaws in heat treatment.

## Proper Use of Valve Cups

In the stripper areas, most wells are produced with pumps using common valve cups. Care of these valve cups is often overlooked because they are an inexpensive item. Upon this small item, however, pump performance depends. It has been found that much down time, lost production, and pulling labor can be saved by following certain rules for valve-cup care.

Valve cups are built to operate while soaked with oil. The practice frequently followed whereby cups are run into the well dry and the pump is started as soon as the servicing job has been completed accounts for many of the cup failures that have brought on frequent rod jobs. If the cup is not given time to absorb oil before its service begins, it will be inflexible, and therefore not likely to form a good seal in the working barrel. As a result, the high pressures against which the cup is subjected may cause bypassing, with the resultant fluid or gas cutting, before the cup has a chance to form a good seal.

When cups are run dry, the well should remain shut down for a few hours after the rods have been hung on the beam in order to condition the cups for service. If there is lost production to be made up, as is usually the case after a pulling job, the conditioning period can be avoided without detriment by soaking the cups in oil at the tool house or at the location where pulling is in progress. It is, of course, important to keep track of the identity of the cups after removing them from their boxes.

Cup followers are likely to develop rough or battered edges after a period of use. Such edges provide improper bearing for the cup shoulders. Cutting often occurs during makeup, and increased wear is apt to occur during pumping service. A small file carefully used can correct this difficulty if the followers have not become too badly worn. However, it is poor economy to attempt reconditioning of followers that are in poor or questionable condition.

There is a strong tendency on the part of rod crews to make up the cup-and-follower assembly too tightly. The cups must be held securely, but more than the necessary pressure weakens the cup shoulder due to shear of some of the outside fibers. The crew man guilty of too much effort in tightening a cup assembly does not lack in willingness, but needs a word of guidance. He probably believes that the extra force will swell the cups outward to form a closer seal in the working barrel. This assumption has been found erroneous, but even if it were correct, the wide assortment of cup sizes available today would make it advisable to select a larger size rather than attempting to expand the cups by an improvised method to an unknown dimension.

When a plunger is pulled, the cups should always be examined before the assembly is broken down. In this way the cups may disclose defects in the working barrel that might be overlooked even in a surface inspection. Vertical grooves down the side of the cups usually indicate the presence of a groove in the working barrel which has permitted bypassing of fluid past the cups to cause the cutting. Sand wear in a flawless working barrel is found to be more general, and does not result in distinct grooves. Even slightly scored barrels should not be allowed to remain in service, because it is impossible to obtain a seal under pressure without a smooth working surface.

Tests have disclosed that it takes very little extra force to install or to move the 15/1,000-in. oversize cups in a new barrel than is required for the standard-size cup. This means that the advantages of the better seal brought about by the larger cup can be obtained without greatly increasing the sucker-rod load. It has been recommended, therefore, by the party responsible for the tests that plungers for new barrels should be fitted with the plus 15/1,000-in. cups, while older barrels in which the extent of wear is not accurately known should use the plus 30/1,000-in. cups.

Due to the design of a cup, all of the load must be absorbed at the shoulder, and not at the lip as has often been thought. Some cups now make us of reinforcing, either by stitching or by other means, in order to give stronger shoulders. On the whole, improvements of this type have been of far greater value than the changes made in lip design.

Recently a plunger has been introduced which depends upon the reaction of oil upon rubber to maintain the sealing effect. The body of the plunger is a one-piece metal member in which closely spaced circular grooves are machined. In these grooves, packing rings composed of fabric and rubber are fitted. Before running, the plunger is immersed in kerosene so that the rings will swell to form a tight fit in the plunger body. As the rings wear, contact with the oil in the well causes the rubber to swell, thereby maintaining a seal in the barrel. The plunger body does not touch the barrel, and water serves as the lubricant between the rubber rings and the barrel. Plungers of this type are therefore most suitable for heavy water wells where there is insufficient oil to lubricate metal-to-metal pumps.

Another type of oil-well pump plunger now uses composition rings made of bakelite impregnated with graphite to solve the lubrication problem in heavy water wells. The graphite gives the rings a self-lubricating property. The rings are held in place by steel spacer rings which have a sliding fit, thereby making it possible for the rings to adjust themselves to variations in worn or untrue working barrels.

cendio. El registro del valor magnético queda anotado en una tabla en el camión. Proyectado principalmente para evitar fallas por fatiga mientras las varillas están ocupadas, el instrumento sirve también para revelar faltas en el tratamiento térmico.

## Correcto uso de tazas de válvulas

En ciertas zonas, casi todos los pozos se hacen producir con bombas que usan tazas de válvulas corrientes o comunes. El cuidado de estas tazas de válvula se descuida a menudo, a causa de que son piezas de poco costo. Sobre esta pequeña pieza, sin embargo, depende el funcionamiento de la bomba. Se ha visto que mucho tiempo de trabajo, pérdida de producción y faenas de tiro pueden evitarse siguiendo ciertas reglas en lo tocante al cuidado de la taza de válvula.

Las tazas de válvulas se construyen para que funcionanen mientras están empapadas de petróleo. La práctica frecuentemente seguida, de meter taza seca en el pozo y de hacer funcionar la bomba tan pronto como termina la limpieza del pozo, explica muchas de las fallas de las tazas y consiguientes reparaciones de varillas. Cuando la taza no recibe tiempo suficiente para absorber petróleo antes de trabajar, quedará inflexible, y por esta razón no formará un cierre seguro en el cilindro de trabajo. Como resultado de esto, las grandes presiones a que está sometida la taza, podrán causar un escape de petróleo o gas, antes de que la taza tenga la oportunidad de formar un cierre hermético.

Cuando las tazas funcionan secas, el pozo debe permanecer cerrado por unas pocas horas después de colgadas las varillas en el balancín, para que las tazas se acondicionen al servicio. Si hay producción perdida por compensarse, como generalmente sucede, después de un trabajo de levantamiento, podrá evitarse el período de acondicionamiento, sin detrimento alguno, empapando las tazas en petróleo en la casa de herramientas o en el mismo punto donde se está haciendo el trabajo. Es importante, por supuesto, llevar cuenta de las tazas, para su correcto identificación, después de quitadas de sus cajas.

Los empujadores de tazas están propensos a ponerse ásperos en sus bordes, después de cierto tiempo de uso. Los bordes ásperos o irregulares proveen un contacto incorrecto para las tazas. A menudo ocurren cortes en el grupo y se presenta la posibilidad de mayor desgaste durante el movimiento de la bomba. Una lima pequeña, correctamente manejada, podrá corregir esta dificultad cuando los empujadores no están demasiado desgastados. Es, sin embargo, economía contraproducente, tratar de arreglar los empujadores que están en condición mala o dudosa.

Existe una gran tendencia entre los trabajadores en la bomba, hacia apretar demasiado el grupo de taza y empujador. Las tazas deben quedar sujetas con firmeza, pero cuando están apretadas con exceso, quedan expuestas a debilitarse por la pérdidas de algunas de sus fibras exteriores. El operario que sigue esta mala costumbre de apretar demasiado el grupo de taza y empujador necesita, por lo tanto una advertencia oportuna para que no siga cometiendo esta falta. El cree que la fuerza adicional tendrá el efecto de extender las tazas hacia afuera, para que formen un cierre más hermético en el cilindro de trabajo. Se ha visto que esta práctica es errónea, pero aun si fuera correcta, el gran surtido de tamaños de tazas que hay hoy día haría recomendable elegir un tamaño más grande, más bien que tratar de ensanchar las tazas por un método improvisado, a una dimensión desconocida.

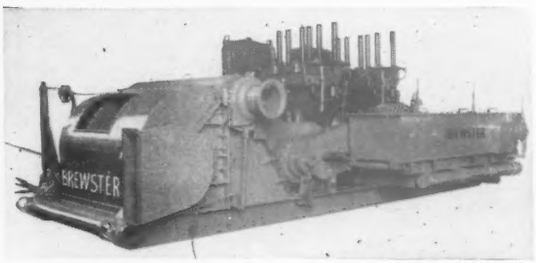
Después de quitado el émbolo, las tazas deben examinarse con cuidado antes de separar el grupo. De esta manera las tazas podrán presentar defectos en el cilindro de trabajo que no podrían ser descubiertos en una inspección superficial. Las ranuras verticales en los lados de las tazas indican generalmente la presencia de una ranura en el cilindro de trabajo, que ha permitido el paso del líquido por las tazas produciendo su cortadura. El desgaste por arena en un cilindro de trabajo, se ha visto que es más general y que no resulta en ranuras distintas. Aun los cilindros levemente rayados no deben permitirse que continuén trabajando, pues es imposible obtener un cierre correcto bajo presión cuando la superficie de trabajo no esta perfectamente lisa.

Los ensayos han mostrado que se requiere muy poca fuerza adicional para montar o mover las tazas de 15/1000 pulgada de sobretamaño en un cilindro nuevo, que la que se necesita para la taza de tamaño normal. Esto significa que las ventajas de un cierre mejor que resultan del uso de una taza más grande pueden obtenerse sin aumentar mucho la carga de las varillas de bomba. Se ha recomendado, por lo tanto, por la persona responsable de los ensayos, que los émbolos para cilindros nuevos llevan tazas con el sobretamaño de 15/1000 pulgada, mientras que los cilindros antiguos, cuyo desgaste no se conoce exactamente, deberán usar tazas con sobretamaño de 30/1000 pulgada.

Debido a la forma de la taza, toda la carga debe ser absorbida en el hombro y no en el borde, como se cree a menudo. Algunas tazas aprovechan el refuerzo, mediante costura u otro medio, para presentar hombros más firmes. En general, el refinamiento de este tipo ha sido de mucho mayor valor que los cambios hechos en la forma del borde.

Recientemente se ha introducido un émbolo que depende de la reacción del petróleo sobre el caucho para mantener el efecto de cierre. El cuerpo del émbolo está representado por un miembro enterizo metálico provisto de ranuras circulares labradas a máquina. En estas ranuras se

# There's 30 Years Experience Behind Every Piece of BREWSTER DRILLING EQUIPMENT




## BREWSTER COMPLETE RIGS

All Brewster Rigs boast many exclusive Brewster features designed and developed by our engineering department. Perhaps the most important single feature is Brewster's 4-speed oilbath transmission. This, combined with the proper friction clutches makes a Brewster Rig as flexible and easy to operate as your automobile. Brewster VO Type Rigs are designed for use with standard derricks and are available in sizes for drilling to 10,000 feet. CR Type Rigs are equipped with a quickly raised mast type derrick. Others with telescoping masts.

## BREWSTER OILBATH ROTARIES

12″
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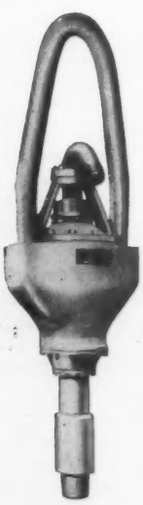
Sizes

Table bearings and gears are oilbath lubricated in separate reservoirs. Pinion shaft roller bearings are pressure lubricated. Slush proof ball bearing table. Gears are machine cut heat treated. Skids and table base are cast integral of electric steel. ALL FOUR SIZES ARE AVAILABLE FOR IMMEDIATE SHIPMENT.



## BREWSTER OILBATH SWIVELS

4″ and 6″ Sizes

The quality reflected in Brewster Swivels is the result of years of experience and carefully checked field tests. Only the finest of materials are used and no expense has been spared to make them the finest and toughest you can buy. Body and bonnet of chrome-moly steel. Wash pipe of carburized and ground seamless tubing. Three sets of roller bearings are employed, each running in a bath of oil. The 4″ size has a capacity of 125 tons. 6″ size a capacity of 250 tons. ALL SIZES ARE AVAILABLE FOR IMMEDIATE SHIPMENT.

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Shreveport, Louisiana, U. S. A.

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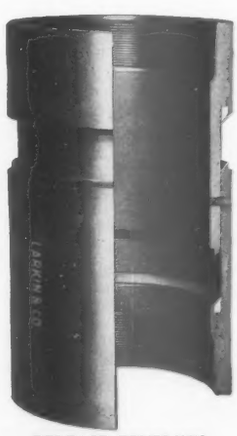
Mediante el empleo de los productos Larkin, contará Ud. con la seguridad de completa satisfacción . . . Fabricamos el surtido de herramientas petroleras más completo y más seguro del mercado . . . Los obturadores "hechos a la medida", es decir, adaptados a cada caso, constituyen nuestra especialidad . . . Podemos suministrar nuestra perfeccionada bomba de arena en cualquier tamaño que se pida . . . El surtido más completo de herramientas de perforación y de pesca, ofrecido a venta o en arriendo bajo contrato . . . Sirvase pedirnos en seguida nuestro catalogo y adope sin pérdida de tiempo, el material Larkin.

HOOK WALL PACKER CASING SIZE

LARKIN WIRE LINE PLUNGER SAND PUMP

## LARKIN & COMPANY
BUTLER, PA.

NO. 1A BIT BOTTOM




RELEASE COUPLING

DRIVE OR CASING SHOE

# McCORD LUBRICATORS

## *Standard Lubricators of the Oil Field*

### McCORD "SP" LUBRICATOR FOR SLUSH PUMPS AND DRILLING ENGINES

The "SP" Lubricator is a development over a period of years to meet the demand for a strong rugged type of lubricator that would withstand vibration and continue to deliver uninterrupted service. The design and workmanship are of the highest type, working tolerances are extremely close, making the "SP" a most accurate and dependable lubricator. This lubricator will stand up under extreme conditions encountered in this service and continue to deliver uninterrupted service.

Features are: Removable pump units. Flexible oil delivery. Large clear sight feeds. Large capacity auxiliary reservoir tank.

Built to handle the heavy grades of oil, this lubricator is standard on Ajax steam drilling engines, National slush pumps, and Gardner-Denver drilling engines and slush pumps.

### THE McCORD "LD" LUBRICATOR DEPENDABLE—ACCESSIBLE—ECONOMICAL

The McCord Class "LD" Lubricator is the only one of the two plunger sight feed types that shows the oil is actually being delivered to the cylinder or part being lubricated. This is an exclusive McCord Safety feature which definitely shows at all times the lubricator is functioning properly. In the McCord Class "LD" after the oil has passed through the sight feed glass, undetected leakage is impossible, an additional safeguard that makes for dependable service.

Pump units can be adjusted to deliver varying quantities of oil from a fraction of a drop to a constant stream, and at any and all speeds. The same quantity of oil is delivered when using a light oil as when using a heavy cylinder oil. Every McCord pump unit is tested against 2000 pounds pressure.

Reservoir capacities 1 qt. to 4 gal. Feeds 1 to 24—30 Standard sizes.

Catalog and Price List on Request.

### McCORD CLASS "SF" LIQUID SIGHT FEED LUBRICATOR

1. *Positive Oil Delivery at all Times.*
McCord Class "SF" Lubricators have been designed to deliver oil at frequent and regular intervals, in a predetermined charge sufficiently large to maintain the oil film on moving surfaces.
2. *Rugged Pump Construction.*
McCord pump units are simple, sturdy and accurate, positive in operation and independently mounted. McCord pump units are the most accurate and efficient known.
3. *Flexibility of Oil Delivery.*
McCord Class "SF"" Mechanical Lubricators have the most flexible and accurate oil delivery known. It is not necessary to disassemble any part of a McCord Class "SF" lubricator in order to make adjustments.
4. *Removable Pump Units.*
Any pump unit may be removed on the McCord Class "SF" Lubricator without stopping the lubricator, nor in any way interfering with its operation.
5. *Adaptability to Source of Power.*
Eighteen types of drive are provided on the McCord Class "SF". A McCord Class "SF" Lubricator may be placed anywhere, either directly on the machine or remote from it, according to the requirements of the job.
6. *Taper Nozzle Gives Accurate Oil Delivery.*
The size of the oil drop leaving the tapered sight-feed nozzle is approximately one gravity drop, the universal standard for measuring lubricants. The nozzle is readily removable giving access to the sight feed check ball.

### THE McCORD TYPE "C" CHEMICAL MEASURING PUMP

The design of this McCord pump incorporates these important features:

(1) The ability to deliver a predetermined amount of liquid, proportioned according to the requirements, over a definite period of time, or a measured quantity, according to speed of the operating machine.
(2) Second only to accuracy is dependability and all units of the McCord pump are designed with long life and durability—an important consideration.
(3) Individual removable pump units make for easy adjustment, for quick removal for cleaning.
(4) All working parts are completely enclosed, operating in oil, fully protected from dust, dirt and the elements.
(5) The McCord design insures positive delivery of liquids even against pressure as high as 2,000 lbs.
(6) McCord engineering is further evident in the fact that the driving mechanism can be readily removed by taking out four bolts, providing it is desired to change to rotary or ratchet drive.

Accuracy of delivery is possible because of the finely engineered design with a minimum number of parts, carefully machined to McCord's close standards. All working parts are enclosed, fully protected from dust, dirt and the elements.

When used for the delivery or injection of chemicals into crude oil lines an auxiliary chemical tank, made of terneplate, of three-gallon capacity is provided. This tank is connected to the suction side of the pump. For this service pump units, made of steel, are used. (Pump units made of other alloys can be supplied.)

### CAPACITY

The ½-inch plunger model delivers one pint of liquid in 261 plunger movements. The ¾-inch plunger model delivers one pint of liquid in 464 plunger movements, while the ⅝-inch plunger model delivers one pint in 167 plunger movements. Catalog on request.

### LUBRICADOR McCORD "SP" PARA BOMBAS DE LODO Y MAQUINAS DE PERFORAR

El lubricador "SP" es el resultado de muchos años de experiencia en la fabricación de lubricadores capaces de satisfacer la demanda de modelos bien firmes para resistir la vibración y seguros para dar un servicio continuo, sin interrupción. En tipo y construcción, estos lubricadores son de primer orden. Debido a sus limitados tolerancias de trabajo, los modelos "SP" son muy exactos y seguros. So prestan al servició más exigente y tienen una duración efectiva verdaderamente extraordinaria.

Sus rasgos principales son: Grupos de bombas separables. Entrega de aceite regulable. Alimentaciones visibles grandes y claras. Depósito auxiliar de gran capacidad.

Construcción adaptada el manejo de los aceites más pesados. El presente modelo es dotación normal en las máquinas perforadores de vapor Ajax, bombas National para lodo y máquinas de perforar y bombas de lodo de marca Gardner-Denver.

### EL LUBRICADOR McCORD "LD" SEGURO — ACCESIBLE— ECONOMIO

El lubricador McCord, de clase "LD" es el único tipo de alimentación visible, de dos émbolos, que permite seguir con la vista la gota de aceita hasta que lleva al punto del cilindro o de cualquier otra parte, que ha de recibirla para su lubracción. Esto constituye un rasgo de seguridad exclusivo del lubricador McCord, que permite asegurarse, en cualquier momento, de que el lubricador está funcionando bien. En el lubricador McCord, después de que el aceite ha pasado por el vidrio de alimentación visible, el escape nunca puede pasar sin ser observado, lo que esuna adicional ventaja de seguridad de correcto servicio.

Capacidades del recipiente, de 1 cuarto de galón a 4 galones. Alimentaciones de 1 a 24-30 de tamaños normales.

A solicitud enviaremos catálogo y lista de precios.

### LUBRICADOR LIQUIDO McCORD DE CLASE "SF" DE ALIMENTACION VISIBLE

*1. Alimentación positiva de aceite en todo momento.*
Los lubricadores McCord de clase "SF" han sido proyectados especialmente para alimentar aceite a intervalos regulares y frecuentes, con una carga determinada de antemano bastante grande para mantener una película de aceite sobre las superficies en movimiento.

*2. Bombas de construcción bien firme.*
Los grupos de bombas McCord son sencillos, firmes y precisos, de funcionamiento positivo y de montaje independiente. Los grupos de bombas McCord son los más eficaces del mercado.

*3. Flexibilidad de la alimentación de aceite.*
Los lubricadores mecánicos McCord de clase "SF" tienen la alimentación de aceite más flexible y más precisa que se conoce en la industria. No hay necesidad de desmontar ninguna pieza del lubricador McCord de clase "SF" para efectuar su regulación.

*4. Grupos de bombas amovibles.*
Del lubricador McCord de clase "SF" se puede desmontar cualquier grupo de bomba sin tener que parar el lubricador o sin que este separación afecte de alguna manera su buen funcionamiento.

*5. Adaptabilidad a la fuente de fuerza motriz.*
Para los lubricadores McCord de clase "SF" se han provisto diez y ocho tipos de propulsión o mando. El lubricador McCord de clase "SF" puede instalarse en cualquier punto, ya sobre la misma máquina, ya a distancia de ella, según las condiciones del trabajo que se presente.

*6. Boquilla cónica para asegurar una precisa alimentación.*
El tamaño de la gota de aceite que cae de la boquilla cónica de alimentación visible es alrededor de una gota de gravedad, que es la medida universal para los lubricantes. La boquilla o surtidor puede desmontarse con facilidad, permitiendo inmediato acceso a la válvula esferica de retención de la alimentación visible.

### LA BOMBA DE DOSIFICACION QUIMICA McCORD DE TIPO "C"

La construcción de esta bomba McCord comprende las importantes características siguientes:

(1) La facultad de alimentar una cantidad fijada de antemano de líquido, dosificada según las necesidades del caso, durante unperíodo dado de tiempo, o una cantidad regulada de acuerdo con la velocidad de la máquina en marcha.
(2) A continuación de la precisión viene la seguridad. Todas las piezas de la bomba McCord se hacen de modo que rindan mucho tiempo de servicio práctico, lo que es un elemente esencial.
(3) El fácil desmontajo de todas las pieza de la bomba McCord permite un ajuste rápido y preciso y una limpieza completa.
(4) Todas las piezas móviles están completamente encerradas, funcionando en aceite, completamente protegidas contra el polvo, tierra y los elementos naturales.
(5) La construcción McCord asegura una alimentación positiva de líquidos, aun en presencia de presiones hasta de 2.000 libras.
(6) La superioridad técnica de la bomba McCord se pone una vez más de evidencia mediante el hecho de que el mecanismo de propulsión puede extraerse con facilidad quitando sencillamente cuatro pernos, en el caso en que se desee pasar a propulsión rotativa o de trinquete.

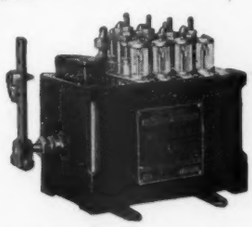
Cunado se emplean estas bombas para alimentar o inyectar productos químicos en los conductos de petróleo crudo, se proveen de un depósito químico auxiliar, de lámina con revestimiento de plomo, con cabida para tres galones. Este depósito se une al lado de aspiración de la bomba. Para este servicio se emplean bombas de acero. (También podemos suministrar unidades de bombas de especiales aleaciones de acero.)

### CAPACIDAD

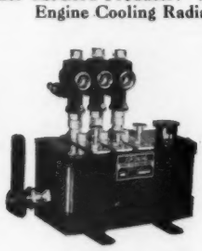
El modelo de émbolo de ½ pulgada alimenta una pinta (como un litro) de líquido en 261 movimientos de émbolo. El modelo de ¾ de pulgada alimenta una pinta de líquido en 464 movimientos de embolo, y el modelo de ⅝ de pulgada alimenta una pinta en 167 movimientos de émbolo. Catálogo a solicitud.

**Other McCord Products: Metallic Asbestos Gaskets; Engine Cooling Radiators; Unit Heaters.**

*"SP" Lubricator for slush pumps*



*4 Feed "LD" Lubricator*

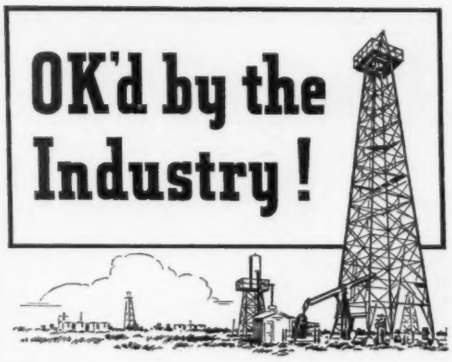


*"SF" Lubricator*

*Chemical Measuring Pump*

## McCORD RADIATOR & MFG. CO., DETROIT, U.S.A.

# OK'd by the Industry!



HUNDREDS of oil field and pipe line installations prove that Ludlow Valves are OK'd by the industry. And every year finds many more Ludlow Valves going into service.

Study the four points in the panel below. They explain the principle of valve construction that Ludlow developed and perfected — they point out the definite benefits that Ludlow Valves offer. Don't take a chance — specify Ludlow for longer life and trouble-free performance.

Ludlow Valve with forged steel welding flanges. Ludlow Valves are furnished in any desired sizes and types for oil field and pipe line service. Write for full information — no obligation, of course.

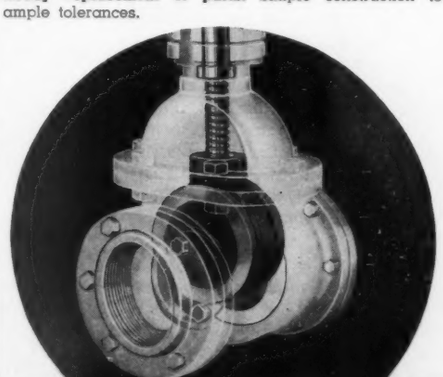
## Ludlow Parallel Seat Double Gate Valves

***Smooth, positive operation.*** Gates positioned directly opposite ports before wedging and entirely unwedged before being raised.

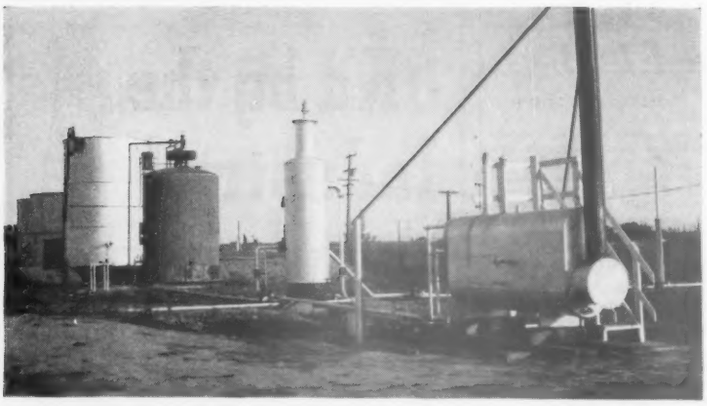
***Positive closure***—even after years of service in the open position. 30° wedges. Gates self-adjusting to seats.

***Self-cleaning.*** Seat rings cleaned throughout entire stroke. No internal guides to cause foul-up.

***Ready replacement of parts.*** Simple construction to ample tolerances.



The LUDLOW VALVE MFG·CO·INC· TROY·N·Y· SINCE 1866



*Owing to equipment shortages, care of material now is more essential. Here is a new-type heater separator, piping and heater having been painted to prevent corrosion. The treating tank, properly mounted on concrete foundation, is to be painted next.*

*Debido a la carestia de equipo, el cuidado del material es ahora más esencial. Mostramos aquí un separador calefactor de nuevo tipo. La tubería y el calefactor se han pintado para evitar la corrosión. El tanque de tratamiento debidamente montado en cimiento de hormigón, se pintará después.*

## Maintenance of Tank Batteries

Lease tanks should come in for special consideration in any program aimed at extending equipment life. Corrosion is the chief factor to be overcome. Many of the more recent tank purchases have specified galvanized-steel construction. Other operators use special paints, or on the very large vessels, cathodic protection, to preserve tank bottoms.

More and more producers, realizing that oxygen is the evil that promotes corrosion, are attacking the problem primarily through exclusion of air from their tanks. The vapor-tight equipment commonly in use for maintaining oil gravity is employed in a manner which makes it only partially successful in keeping air out of the tanks. During the storage of oil the pressure cover is kept in place, but when it comes time to run the oil, the cover is opened and air admitted.

Even on the most simple of vapor-tight batteries it is possible to avoid admitting oxygen during drainage of the tank by merely installing a small line to the top of the tank from some source of supply where gas will be available while the tank is on the line. The gas may be supplied from a separator which discharges into a different tank, or from a residue line, or from a well.

Other rules for tank care include immediate repair of seam leaks, frequent inspection of bottoms to guard against the start of corrosion, and regular application of paint. Proper drainage at the base is important, as water within the fire walls tends to increase corrosion from the outside. The tank should be mounted on a raised foundation of concrete, or a steel platform for maximum life. If such a foundation is not used the setting should be prepared by placing a level bed of gravel upon solid ground and covering it with tar paper or other waterproof material.

An improved method has been developed for avoiding the release of vapor which ordinarily takes place due to the turbulence caused by oil entering the tank. The old practice was to permit the incoming oil to drop from the roof of the tank to the oil surface. This resulted in extreme agitation of much of the oil in the tank. Improvements followed whereby the oil was introduced either at the bottom or through a pipe within the tank which discharged below the fluid surface. However, under either of these arrangements the gas released below the fluid surface of oil served to agitate the contents of the tank somewhat. The latest improvement avoids this last objection by using a sloping open trough inside of the tank. Through the inlet at the top of the tank, the production enters the top of the open trough. While the oil is flowing down the trough, gas is liberated, and the incoming oil only causes harmless oil currents within the tank. In other new installations the oil entering the top of the tank is directed against the side of the vessel at an angle.

*Double vibrating screen permits greater removal of cuttings and prevents their recirculation. The screens are mounted on the top of tanks used in the place of pits. The tanks make it possible to use flooded suctions and also to have closer control over the mud*

*El colador vibratorio doble permite un mayor desprendimiento de particulas e impide que circulen de nuevo. Los coladores se colocan encima de los tanques que se usan en lugar de fosos. Los tanques hacen posible un gobierno más seguro del lodo de circulación*

colocan empaquetaduras anulares de tela y caucho. Antes de funcionar, el émbolo se sumerge en keroseno, para que los anillos se hinchen y formen un ajuste apretado en el cuerpo del émbolo. Con el desgaste de los anillos, el contacto con el petróleo en el pozo hace que se hinche también el caucho, monteniéndose así un buen cierre en el cilindro. El cuerpo del émbolo no toca el cilindro, y el agua sirve de lubricante entre los anillos de caucho y el cilindro. Los émbolos de este tipo son, por lo tanto, más adaptados a pozos con mucha agua, donde hay insuficiente petróleo para lubricar las bombas que tienen contacto métilico directo.

Otro tipo de émbolo de bomba de pozo de petróleo usa ahora anillos de composición hechos de baquelita impregnada con grafito, para resolver el problema de la lubricación en pozos acuosos. El grafito da a los anillos una propiedad de lubricación automática. Los anillos se sujetan en su sitio por separadores anulares de acero, que tienen un ajuste corredizo, lo cual permite a los anillos ajustarse por si mismos a las variaciones en los cilindros desgastados o inexactos.

## La conservación de los Tanques

Los tanques en la propiedad merecen especial consideración en todo programa de mayor duración efectiva del equipo. La corrosión es aquí el problema principal que resolver. Muchas de las más recientes compras de tanques han especificado una construcción de acero galvanizado. Otros dueños usan pinturas especiales, y en los tanques más grandes, protección catódica para proteger los fondos.

Más y más productores, comprendiendo que el oxígeno es el mal que fomenta la corrosión, están atacando el problema principalmente por medio de la exclusión del aire de sus tanques. El equipo hermético al vapor que se usa comunmente para mantener la densidad del petróleo, se está empleando de una manera que lo hace sólo parcialmente efectivo en la exclusión del aire de los tanques. Durante el almacenamiento del petróleo, la tapa de presión sa mantiene en su sitio, pero cuando viene el momento de sacar petróleo, la tapa se abre y el tanque se llena de aire.

Hasta en las instalaciones más sencillas de tanques herméticos al vapor es posible evitar la admisión de oxígeno durante la salida del líquido del tanque, sencillamente instalando una pequeña tubería que vaya al tope del tanque, desde una fuente de abastecimiento donde se disponga de gas mientras el tanque se está vaciando. El gas podrá suministrarse de un separador, que descargue dentro de un tanque diferente, o de una tubería de residuo, o de un pozo. En la mayor parte de los casos, se requiere un regulador de presión en la pequeña tubería, para evitar todo daño al tanque.

Otras reglas para el cuidado de los tanques incluyen la reparación de escapes por las costuras, frecuentes inspecciones de los fondos para impedir el comienzo de la corrosión y periódica aplicación de pintura. El desague correcto en la base es importante, pues el agua dentro de las paredes contraincendio tiende a aumentar la corrosión por la parte de afuera. El tanque debe montarse sobre un cimiento de hormigón levantado sobre el piso o en una plataforma de acero, para su máxima duración. De no usarse semejante base, el suelo debe entonces prepararse colocando una capa bien a nivel de grava sobre terreno sólido y cubriéndola con papel alquitranado u otro material impermeable.

Se ha descubierto un método perfeccionado para evitar el escape de vapor, el cual ocurre ordinariamente a causa de la turbulencia causada por el petróleo al entrar en el tanque. La antigua práctica era permitir que el petróleo entrante cayera del techo del tanque a la superficie del petróleo. Esto resultada en extrema agitación de gran parte del petróleo en el tanque. Los perfeccionamientos introducidos son muy sencillos. El petróleo se introduce por el fondo o bien por un tubo dentro del tanque que descarga por debajo de la superficie del líquido. Sin embargo, en ambos de estos casos, el gas que se escapa por debajo de la superficie del líquido servía para agitar el contenido del tanque hasta cierto punto. El más reciente perfeccionamiento evita esta objeción, pues se vale de canal abierto inclinado, que pasa por dentro del tanque. Por la entrada arriba del tanque se introduce el petróleo por este conducto abierto. Mientras el petróleo va descendiendo por el canal, se escapa gas y el líquido que entra sólo produce inofensivas corrientes dentro del tanque. En otras instalaciones, el petróleo que entra por arriba del tanque es dirigido hacia el lado del depósito a cierto ángulo.

# BAROID PRODUCTS

## Universally Used

## FOR FASTER, SAFER, MORE ECONOMICAL DRILLING

BAROID is a high specific gravity weighting material prepared for addition to rotary drilling fluids to control formation pressures and to prevent caving. It is manufactured from barytes (native barium sulphate) and processed especially for oil well use. Only a small amount of colloidal material is necessary to keep BAROID from settling and to hold it in suspension indefinitely. BAROID is non-abrasive, non-corrosive, and chemically inert and not injurious to drilling equipment.

COLOX, a drilling mud weighting material composed chiefly of iron oxide, has a high specific gravity and makes possible the use of drilling muds with densities as high as 20 pounds per gallon (150 pounds per cubic foot). COLOX is used to help control gas, oil, water or formation pressures, and helps to prevent caving.

AQUAGEL is a gel-forming colloidal drilling clay made from carefully selected bentonites. It is almost 100 per cent colloidal material and consequently is free from abrasive particles. AQUAGEL-muds deposit a thin, easily-removable cake on the walls of the hole and allow only a small amount of water to penetrate the formation. AQUAGEL helps to prevent loss of circulation, caving, stuck drill pipe, twist-offs, abrasion and corrosion, balling of underreamers and tight hole.

STABILITE is a chemical in powder form for the treatment of drilling mud to reduce viscosity and gel-strength, free entrained gas, and enhance the wall-building properties. It is superior to other chemicals commonly used to treat drilling muds in that its viscosity reduction is greater and its effects are longer lasting and not so subject to the dissipating effects of elevated temperatures.

### BAROID PRODUCTS

BAROID and COLOX: Drilling Mud Weighting Materials.

AQUAGEL: Gel-Forming Colloidal Drilling Clay.

FIBROTEX: A Fibrous Material For Restoring Lost Circulation.

BAROCO: A Salt-Water-Resisting Drilling Clay.

STABILITE: A Superior Chemical Mud Thinner.

AQUAGEL-CEMENT: Material For Recovering Lost Circulation And Cementing Casing.

SMENTOX: Material For Overcoming The Effect Of Cement-Contamination In Mud.

ZEOGEL: A Special Clay To Be Used As A Suspending Agent When High Concentrations Of Salt Or Salt Water Are Encountered.

MICATEX: A Material For Reducing Water Loss To The Formation And For Overcoming Mild Cases Of Lost Circulation.

IMPERMEX: A Concentrated Colloidal Additive Agent For Reducing Water Loss In Salt-Laden Muds.

TESTING EQUIPMENT: Apparatus For Making Complete Field And Laboratory Examinations Of The Properties Of Drilling Mud.

SERVICES—DRILLING MUD ANALYSIS AND CONTROL: Baroid Service Engineers And Their Laboratory-Equipped Cars Are Available In All Active Oil Fields Of The United States. These Engineers Are Trained And Experienced In Analyzing And Correcting Mud Troubles.

BAROID WELL LOGGING SERVICE: Formation Information Through Mud Analysis.

## PRODUCTOS BAROID

### Usados universalmente para la perforación más rápida, segura y económica

BAROID es un material aumentador de peso, de alto peso específico, preparado para agregarse a los líquidos de perforación rotativa para controlar las presiones de formación e impedir el derrumbamiento. Se hace de baritas (sulfato de bario natural) y se prepara especialmente para uso en pozos de petróleo. Se requiere sólo una pequeña cantidad de material coloidal para impedir que el BAROID se precipite y para mantenerlo indefinidamente en suspensión. BAROID no es raspante ni corrosivo; es químicamente inactivo e inofensivo al equipo de perforación.

COLOX es un material para aumentar el peso del lodo y se compone principalmente de óxido de hierro. Tiene un alto peso específico y permite el uso de lodos de perforación con densidades hasta de 20 libras por galón (150 libras por pié cúbico). COLOX se usa para ayudar a gobernar el gas, petróleo, agua o presiones de formación y también para ayudar a evitar el derrumbe.

AQUAGEL es una greda coloidal de perforación, formadora de gelatina, hecha de bentonitas cuidadosamente elegidas y preparadas. Es casi 100% material coloidal, y por esta razón, está exento de partículas abrasivas o raspantes. Los lodos tratados con AQUAGEL depositan una delgada capa de fácil remoción sobre las paredes del agujero y permiten la penetración de sólo una pequeña cantidad de agua en la formación. AQUAGEL ayuda a impedir la pérdida de circulación, el derrumbe, el atascamiento del tubo de perforación, las retorceduras, el raspaje, la corrosión, la deformación de las herramientas y la estreches del agujero.

STABILITE es una substancia química, en forma de polvo, para el tratamiento del lodo de perforación, para reducir la viscosidad y fuerza gelatinosa, poner en libertad el gas tapado y acentuar las propiedades de retención de pared. Es superior a otras substancias químicas de uso corriente, para el tratamiento de lodos de perforación, a causa de que su reducción de viscosidad es mayor y sus efectos más durables, sin quedar sujetos a la acción disipante de las altas temperaturas.

### PRODUCTOS BAROID

BAROID y COLOX: Materiales para aumentar el peso de los lodos de perforación.

AQUAGEL: Greda coloidal de perforación formadora de gelatina.

FIBROTEX: Un material fibroso para restablecer la circulación perdida.

BAROCO: Greda de perforación resistente al agua salada.

STABILITE: Un excelente producto químico para diluir el lodo.

AQUAGEL-CEMENT: Material para recuperar la circulación perdida y cementar revestimiento.

SMENTOX: Material para contrarrestar el efecto de la contaminación del cemento en lodo.

ZEOGEL: Una greda especial, que se usa como agente de suspensión cuando se presentan grandes concentraciones de sal o agua salada.

MICATEX: Un material para reducir la pérdida de agua, que va a la formación, y para curar los leves casos de pérdida de circulación.

IMPERMEX: Un agente coloidal concentrado, que se agrega para reducir la pérdida de agua en lodos cargados de sal.

EQUIPO DE ENSAYO: Aparatos para hacer ensayos completos en el campo y examenes de laboratorio de las propiedades del lodo de perforación.

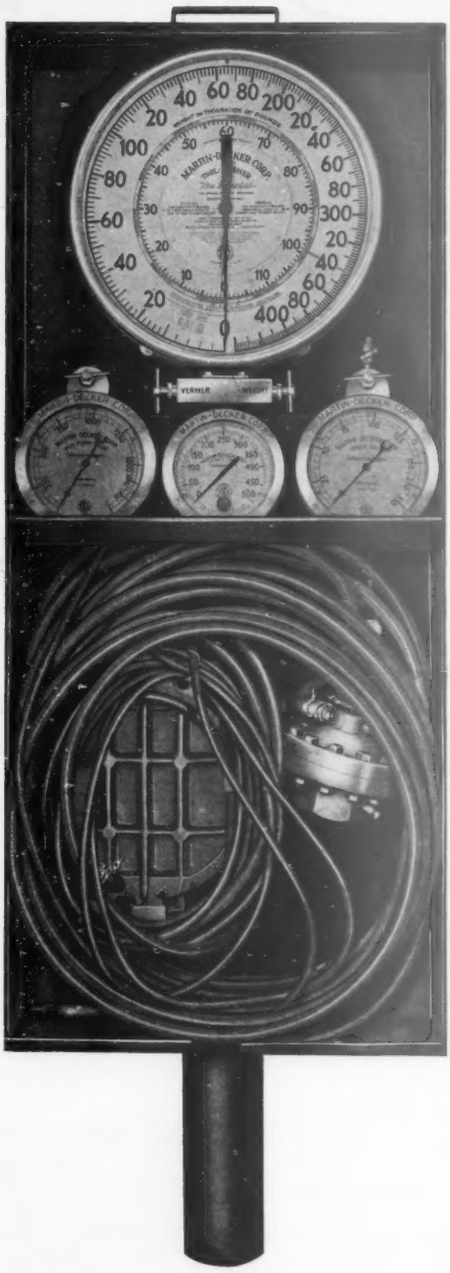
SERVICIOS—ANALISIS Y GOBIERNO DEL LODO DE PERFORACION: Los ingenieros del Servicio Baroid y sus laboratorios instalados en automóviles, están a la disposición de los interesados en todos los campos petrolíferos activos de los Estados Unidos de América. Estos ingenieros tienen el conocimiento y la experiencia práctica para analizar y corregir los problemas de lodos de perforación.

SERVICIO BAROID DE INFORME DIARIO DE PERFORACION DE POZOS: Información sobre la formación o yacimiento mediante análisis del lodo.

## BAROID SALES DIVISION

**NATIONAL LEAD COMPANY**

BAROID SALES OFFICES: HOUSTON • LOS ANGELES • TULSA



# You can efficiently meet *all* you

# Martin-Decke

## "SEALTITE" DRILLING CONTROL

If you're looking for an instrument that will help you control every important drilling function . . . that's more accurate, sensitive and dependable than any previous instrument . . . that has capacity to handle the deepest well you drill . . . you'll find it in the "Sealtite." It shows—continuously—weight on bit, mud pump pressure, drill pipe torque and rotary table speed . . . and simultaneously records weight, mud pressure and torque on a single chart. With a temperature-corrected, direct reading Weight Indicator, able to handle 20,000 foot wells, and Mud Pump, Torque and Tachometer Gauges having capacities for all modern speeds and pressures, the "Sealtite" is the instrument you need for complete drilling control under all conditions.

The "Sealtite" has all five control units in one compact steel box, ready for installation. The permanently closed sealed fluid system (using high pressure hose instead of copper tubing) eliminates leakage, expansion, and requires no pumping-up, no adjusting, no disconnecting from the diaphragms when moved from well to well. The "Sealtite" is ready to install the minute it reaches your rig. Other important "Sealtite" features include a vernier mechanism for accurate weight control when coring, fishing, etc., indicator dials calibrated in pounds, points, or the metric system, as desired, and indirect illumination for easy night reading.

Write Martin-Decker today for complete information on this outstanding Drilling Control Instrument.

### GOBIERNO DE PERFORACION "SEALTITE"

Si Vd. anda en busca de un instrumento que le sirva para ayuarle a gobernar cada importante función de perforación . . . más exacto, sensitivo y seguro que todo otro instrumento anterior . . . con capacidad para adaptarse al pozo más profundo que Vd. perfore . . . hallará lo que desea en el "Sealtite". Este instrumento muestra de una manera contínua, el peso en la barrena, la presión de la bomba de líquidos lodosos, esfuerzo de rotación del tubo de perforación y velocidad de la plataforma de la rotativa . . . y simultaneamente registra el peso, el esfuerzo de rotación, la presión de la bomba de lodo, en una sola tabla. Con un indicador de peso de temperatura corregida y lectura directa, capaz de manejar pozos de 20.000 piés, y manómetros de bomba de lodo, de esfuerzo de rotación y contador de velocidad, con capacidades para todas las velocidades y presiones modernas, el "Sealtite" es el instrumento que Vd. necesita para el gobierno completo de la perforación, bajo toda condición de trabajo.

El "Sealtite" tiene todas las cinco unidades de gobierno dispuestas en una compacta caja de acero, todo listo para inmediata instalación. El sistema de flúido permanente cerrado y sellado (que usa mangueras de alta presión, en lugar de tubería de cobre) evita todo escape, efecto de dilatación y humedad, sin requerir ninguna acción de bomba, ningún ajuste, ninguna desconexión de los diafragmas al ser trasladado de un pozo a otro. El "Sealtite" está listo para instalación el momento mismo en que llega a su aparejo de perforación. Otros importantes rasgos del "Sealtite" comprenden un mecanismo de vernier para el gobierno preciso del peso al sacar núcleos o muestras, pesar útiles, etc., cuadrantes de indicación graduados en libras, puntos o en sistema métrico, como se pida, e iluminación indirecta para la fácil lectura nocturna.

Escriba a la Martin-Decker por información completa sobre este admirable instrumento de gobierno de perforación.

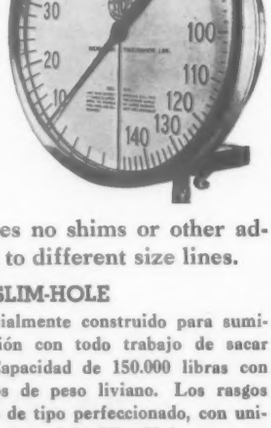
## SPECIAL ILLUMINATED WEIGHT INDICATOR

Here is a completely portable weight indicator for any job on the lease where quick installation is required. Its oversize gauge mechanism has greater capacity than any previous instrument—315 tons with a string-up of 10 one-inch lines. The vernier mechanism—six times as sensitive as the regular one—indicates the slightest weight change on the most delicate fishing or coring jobs. Built-in illumination affords full visibility at night from any part of the rig floor. Ten quickly interchangeable dials are provided for use with all conventional string-ups and line sizes, and a "points" dial is visible at all times for those preferring to use that system. Metric dials are available. The Special clamps directly to the deadline; for close weight control an instrument such as the "Sealtite"—installed right before the driller—is recommended.

### INDICADOR ESPECIAL DE PESO ILUMINADO

Este es un indicador de peso completamente portátil, para cualquier trabajo en el campo, donde se requiera una rápida instalación. Su mecanismo de indicación, de tamaño extra grande, tiene mayor capacidad que todo otro instrumento anterior—315 toneladas con una serie de 10 líneas de una pulgada. El mecanismo de vernier, seis veces más sensitivo que el corriente, indica el más leve cambio de peso en los trabajos más delicados de pescar o sacar núcleos. Su iluminación integrante permite su visibilidad en la noche desde cualquier punto del piso de la torre o aparejo. Se suministran diez cuadrantes de rápido intercambio, para uso con todas las series corrientes y tamaños de cables, y hay un cuadrante de puntos, visible en todo momento, para aquellos que prefieren usar este sistema. Ofrecemos también cuadrantes en sistema métrico. El modelo Especial se asegura directamente al cable muerto. Para el exacto gobierno del peso se recomienda un instrumento como el "Sealtite"—instalado al frente del perforador.

## SLIM HOLE WEIGHT INDICATOR



The Slim Hole is especially built to provide accurate readings of weight in all shallow field or core testing work. Capacity is 150,000 pounds with six lines, ample for most light weight jobs. Construction features include a newly-designed gauge case with built-in diaphragm unit, making the Slim Hole extremely compact and portable. A "C" clamp which operates in back of the case, permitting use of the full dial circumference, is another important feature. The Clamp requires no shims or other adjustments for attaching the instrument to different size lines.

### INDICADOR DE PESO SLIM-HOLE

El indicador de peso Slim-Hole está especialmente construido para suministrar acusaciones exactas de peso en conexión con todo trabajo de sacar muestras o núcleos y otras obras similares. Capacidad de 150.000 libras con seis cables, amplia para casi todos los trabajos de peso liviano. Los rasgos de construcción incluyen una caja de manómetro de tipo perfeccionado, con unidad de diafragma integrante, lo que hace que el modelo Slim-Hole sea muy compacto y portátil. Una abrazadera en "C", que actúa al respaldo de la caja, permite el uso de un cuadrante de circunferencia completa, lo cual es otro rasgo importante. La abrazadera no requiere laminitas, cuñas u otros ajustes, para la unión del instrumento a cables de diferentes tamaños.

## THE CLIPPER TOOL-PUSHER WEIGHT INDICATOR

Operators requiring a rugged, compact and highly portable weight indicator for use in ordinary drilling or production work will find the Clipper equal to any job. Clamped to the deadline in an instant, it gives accurate, dependable readings of weight up to 243 tons with 10 one-inch lines, and has the vernier hand for extremely sensitive readings when fishing, milling, etc. Accommodates all conventional string-ups and line sizes. Exceptionally light weight not only makes carrying easy, but eliminates tendency for the instrument to swing on the deadline in rough drilling. Since the Clipper must be read across the derrick floor, an instrument such as the "Sealtite" is desirable when greater legibility is required.

### INDICADOR DE PESO CLIPPER, TIPO PORTATIL

Los perforadores que necesiten un indicador de peso de tipo portátil, firme, compacto y exacto, para uso en perforación corriente o en trabajo de producción, encontrarán en el Clipper exactamente lo que desean. Se asegura al cable muerto en un instante y da exacta y segura lectura de peso hasta 243 toneladas con diez líneas de una pulgada, teniendo un vernier para acusaciones de extrema sensitividad para trabajos de pesar útiles, etc. Se adapta a todas las series o cadenas corrientes y tamaños de cables. Su peso extraordinariamente liviano no sólo facilita su transporte a cualquier punto, sino que suprime también la tendencia a oscilación en el cable muerto, al tratarse de perforación dura. Como el Clipper ha de leerse a través del piso de la torre o aparejo, se recomienda un instrumento como el "Sealtite" cuando se necesite mayor legibilidad.

# control needs with these *Instruments*

## UNITIZED MUD PUMP GAUGE

Here's a portable mud pump gauge that's far ahead of the field when it comes to accuracy, sensitivity, smoothness and ease of reading. The Unitized is installed on the pump or mud line by simply making one union connection, and accurately shows all pump pressures up to 5000 pounds. It is unaffected by heavy pulsation or vibration, and its oil-filled mechanism is fully protected against mud fluid, rust or corrosion, insuring long life and trouble-free performances on well after well. The large numerals stand out clearly from a distance of more than 30 feet, and readings can easily be made by simply noting the position of the gauge hand. Vernier retard movement covers both low and high pressure ranges with extreme accuracy, and a special damper permits adjusting the hand for overthrow. Rugged all-bronze gauge case further protects all working parts. The Unitized is furnished in one, three or five thousand pound capacities for all portable installations. When extremely accurate pressure control is required a "Sealtite" Mud Pump Gauge, mounted right in front of the driller, is recommended.

For further information on these or any other Martin-Decker Oil Field Instruments, consult your latest Composite Catalog or write direct to Martin-Decker Corporation.

### MANOMETRO UNITIZED DE BOMBA DE LODO

Este es un manómetro portátil de bomba de lodo, lo mejor de su clase en lo tocante a exactitud, sensitividad, seguridad y facilidad de lectura. El Unitized se instala en la bomba sencillamente haciendo una conexión de unión, y muestra precisamente las presiones de la bomba hasta 5000 libras. Es inafectado por las violentas pulsaciones o vibraciones y su mecanismo en baño de aceite está completamente protegido contra el liquido lodos, enmohecimiento o corrosión, lo cual le asegura prolongada duración y funcionamiento expedito y exacto en pozo tras pozo. Los números grandes se ven claramente a una distancia de más de 30 piés y las acusaciones pueden hacerse sencillamente observando la posición de la cabeza del manómetro. Un vernier facilita más aún la exactitud en las escalas de altas y bajas presiones. Una firme caja de bronce sirve de adicional protección a las piezas del manómetro. El Unitized se suministra en capacidades de mil, tres mil y cinco mil libras, para todas las instalaciones portátiles. Cuando se requiere un gobierno de presión extremadamente preciso, se recomienda el manómetro de bomba de lodo "Sealtite", que se instala al frente del perforador.

Para información más detallada de los presentes y otros instrumentos Martin-Decker para campos petrolíferos, consulte el catálogo compuesto o escriba directamente a la Martin-Decker Corporation.

## MARTIN-DECKER MUD LOGGER

The Mud Logger provides a clear, continuous record of both mud weight and viscosity during drilling operations. The easily-read chart shows mud weight in pounds per cubic foot, pounds per gallon or specific gravity—as desired—and shows mud viscosity in centipoises. With this information, maximum mud efficiency and full control over mud condition can be maintained at all times.

Information interpreted from the chart is vitally important in reducing mud conditioning and drilling expense. Cost of new mud as well as admixtures can be held at a minimum by watching the cycle for variations and then conditioning only in the cycle where necessary. The instrument detects mud channeling, frequent forerunner of stuck drill pipe . . . helps detect water losses . . . reduces the hazard of unforeseen weight changes . . . provides a method for studying effect of mud characteristics on drilling speed and efficiency . . . and gives other valuable mud data.

The Mud Logger is simple in design, uses few parts, and is ruggedly built throughout for oil field service. It is installed on the mud ditch with the rotor element—actuated by an electric motor (50 or 60 cycle, 110 Volt. a.c. current required)—immersed in the mud stream. There is no interference with uniform mud flow. Filling pens and changing charts once a day is the only attention required.

### REGISTRADOR DE LODO MARTIN-DECKER

El registrador de lodo provee un registro claro y continuo del peso y de la viscosidad del lodo durante los trabajos de perforación. La tabla de fácil lectura muestra el peso del lodo en libras por pié cúbico, libras por galón o peso especifico—como se desee —y muestra la viscosidad del lodo en centipoises. Con esta información, se mantienen todo el tiempo el máximo rendimiento del lodo y el gobierno completo de la condición del lodo.

La información interpretada de la tabla es vitalmente importante para reducir el acondicionamiento del lodo y los gastos de perforación a un mínimo, observando el ciclo de variaciones y acondicionando entonces dentro del ciclo en que sea necesario. El instrumento descubre la canalización de lodo, indicación anticipada de la paralización del tubo de perforación . . . ayuda a descubrir las pérdidas de agua . . . reduce el peligro de cambios imprevistos de peso . . . provee un método de estudiar el efecto de las características del lodo sobre la rapidez y eficacia de la perforación . . . y da finalmente otros importantes datos sobre el lodo.

El registrador Mud Logger es sencillo en tipo, usa pocas piezas y por su firme construcción se adapta muy bien al servicio. Se instala en la zanja de lodo, con el elemento de rotor, actuado por un motor eléctrico (de 50 o 60 periodos, 110 v. de c.a.) quedando sumergido en la corriente de lodo. No hay ninguna perturbación con la uniforme corriente de lodo. La llenada de los receptáculos y el cambio de las tablas una vez al día es toda la atención que requiere.

**ON WELLS the world over you'll find Martin-Decker Instruments cutting drilling time and reducing equipment costs. With these instruments, operators accurately control weights, pressure, speeds and other important drilling factors to insure maximum hole per dollar!**

**The Martin-Decker Products shown here cover a complete range of control needs. They will fit right in with your current development program, whatever your requirements may be. Put them to work on your wells . . . they'll prove the most valuable aid you can find to slice drilling costs.**

**EN los pozos de todo el mundo, los instrumentos Martin-Decker se usan para reducir el tiempo de la perforación y los costos de equipo. Con estos instrumentos, los dueños gobiernan exactamente los pesos, presiones y otros importantes factores de la perforación, para asegurar rendimiento máximo por el precio.**

**Los productos Martin-Decker, mostrados aquí, cubren la completa escala de necesidades de gobierno. Se adaptarán correctamente a su programa corriente de desarrollo, no importa cuáles sean sus requisitos. Póngalos a trabajar en sus pozos . . . con la seguridad de que le resultarán sumamente eficaces para reducir el costo de la perforación.**

## AUTOMATIC RATE OF PENETRATION RECORDER

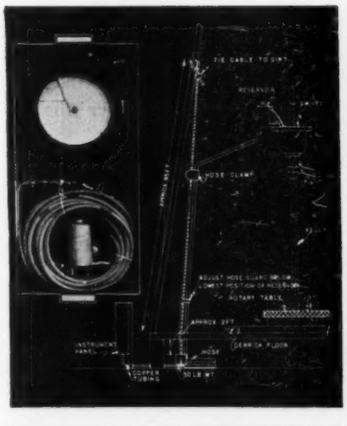
This instrument automatically and continuously records bit penetration rate while drilling, putting time-drilling-logging on an accurate, fool-proof basis that makes the information far more valuable than ever before.

In overseas drilling, the data is particularly valuable in giving a composite picture of the formations drilled by showing all the formation breaks as they occur. It gives the operator a means of correlating weight, mud pressure, etc., with drilling speed to increase efficiency . . . it provides a means of checking equipment performance . . . it is valuable for comparison with the electrical log of the well . . . it helps decide the coring program . . . and it accurately indicates porosity of limestone formations. The Rate of Penetration Recorder is simple to install and use, and requires attention only once a day.

### REGISTRADOR AUTOMATICO DEL REGIMEN DE PERFORACION

Este instrumento registra automatica y continuamente el régimen de penetración de la barrena durante la perforación, colocando el registro de tiempo de perforación sobre una base exacta y segura y dando a esta información mucho más valor que el que ha tenido hasta ahora.

En la perforación en el extranjero, esta información es particularmente valiosa, pues da un cuadro completo de las formaciones perforadas, mostrando todas las interrupciones de la formación, a medida que se presentan. Da al operario un medio de correlacionar el peso, presión de lodo, etc. con el rapidez de la perforación, para aumentar el rendimiento . . . provee un medio de verificar el funcionamiento del equipo . . . es muy valioso para la comparación con el informe de perforación por el sistema eléctrico . . . ayuda a formular el programa de sacar muestras o núcleos . . . e indica exactamente la porosidad de las formaciones de pieza caliza. El registrador de régimen o velocidad de penetración es fácil de instalar y de usar y requiere atención sólo una vez al día.



**BESIDES THE PRODUCTS ILLUSTRATED AND DESCRIBED ON THESE PAGES, MARTIN-DECKER MANUFACTURES THE FOLLOWING OIL FIELD INSTRUMENTS—**

| | |
|---|---|
| Drill Logger | 1000 lb. Unitized Mud Pump Gauge |
| Measuring Line Weight Indicator | Pump Dynamometer |
| Cement Pump Gauge | Rapid Pressure Booster |
| Individual Mud Pump Gauge | Pulsation Damper |

# Martin-Decker Corp.

*"Home of the Weight Indicator"*

LONG BEACH, CALIFORNIA

*San Joaquin Valley:* A. F. McQuiston, Bakersfield, California

*Mid-Continent Distributor:* Reed Roller Bit Company, Houston, Texas

# Developments in Refining

# Desarrollos en Refineria

MORE than ever, the activities of the petroleum refining industry are bent toward supplying the needs for national defense. Lately, these needs have spread beyond the boundaries of the United States to include the requirements of England, Russia and smaller nations bound to a sympathetic cause. The demands now being made against the industry far exceed anything previously anticipated. Because of this situation, it is only natural that developments in petroleum refining be influenced by these unusual requirements.

Domestic consumption of all products has reached new high levels. This is owing to the increased tempo of industry in the production of war materials. Export aviation gasoline is being sought in very large quantities for shipment abroad under the terms of the lease-lend law. These total requirements have lifted crude runs to stills to unprecedented heights and have encouraged reappraisals of all equipment for the purpose of expansion of volume without making substantial additions to equipment.

As the year draws to a close, a spokesman for the federal Government warns the industry of four problems to be faced. The first is "priority" in obtaining supplies. It has been announced that maintenance and replacement items can be obtained in order to keep plants running. On the other hand, it has been stated that no materials can be used for building new equipment unless it is to be used for producing a commodity going directly into national defense. This could mean retarding the development and adoption of many new processes.

Another problem is the production of 100-octane number aviation gasoline. The shipment of large quantities of this grade abroad, coupled with rising needs at home, strains production facilities. It has been authoritatively stated that production should be trebled. A survey has been made of all refineries to that end.

Still another problem coming into view is that of a possible shortage of antiknock agents because of metals and chemical shortages. Such a shortage might mean the stabilization of octane numbers on regular grade gasolines at a lower level in order to conserve these materials.

A third problem is that of distributing all products. It is essential that refining operations be conducted so that the required products can be distributed equitably and without a building program in order to bolster points having low stocks and high consumption.

In addition to the requirement for increasing quantities of high-octane number aviation gasoline, there is a growing demand for fuel to supply the increasing tank production. New tanks are being powered with radial, air-cooled engines. Fuels of 80 and 91-octane number are generally specified to run them. It may be

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LAS actividades de la industria de la refinación de petróleo están ahora dedicadas, con más ahinco que nunca, a satisfacer las necesidades de la defensa nacional. Ultimamente, estas necesidades se han extendido más allá de los límites de los Estados Unidos de América, pues incluyen ahora los requisitos de Inglaterra, Rusia y de otras natciones más pequeñas unidas en la defensa de una causa comun. Debido a esta situación, es muy natural que los desarrollos en la refinación de petróleo pueden sometidos a la influencia de estos requisitos extraordinarios.

El consumo nacional de todos los productos ha llegado a nuevos niveles de gran magnitud. Esto se debe al acelerado paso de la industria en la producción de materiales de guerra. La gasolina de aviación, para la exportación, tiene ahora demanda en grandes cantidades, para su embarque al extranjero, bajo las condiciones de la ley de arriendo y préstamo. Estos enormes totales han aumentado la destilación del petróleo crudo a cifras sin precedente y promovido un estudio concienzudo de todo el equipo disponible para aumentar el volumen sin hacer adiciones considerables a ese equipo.

En estos últimos meses del año, un representante del gobierno federal advierte que la industria está confrontando cuatro problemas. El primero es la "prioridad" en obtener abastecimientos. Se ha anunciado que podrán obtenerse artículos necesarios para la conservación y reparación, a fin de mantener activas las diversas instalaciones. Por otra parte, se ha dicho que no habrán materiales para la construcción de nuevo equipo, a menos que se dediquen a la producción de algo directamente relacionado con la defensa nacional. Esto muy bien podría significar el retardo del desarrollo e implantación de muchos procedimientos nuevos.

Otro problema es la producción de gasolina de aviación con índice octano de 100. El embarque de grandes cantidades de esta clase de gasolina al extranjero, unido a las crecientes necesidades nacionales, tiende a limitar las facilidades de producción. Se ha dicho autorizadamente que la producción debería triplicarse. Y para este fin, se ha hecho un estudio detenido de todas las refinerías.

Otro problema por enfrentar es el de la posible escasez de agentes antidetonantes, debido a la carestía de metales y substancias químicas. Semejante escasez significaría la estabilización de los índices de octano en las gasolinas de clase corriente a un nivel más bajo, a fin de conservar estos materiales.

Un tercer problema es el de la distribución de todos los productos. Es esencial que las operaciones de la refinación se conduzcan de modo que los productos requeridos puedan distribuirse equitativamente y sin un programa de construcción para favorecer puntos que tienen limitado abastecimiento local y al mismo tiempo un gran consumo.

En adición al requisito de aumentar las cantidades de gasolina de aviación de alto índice octano, existe una creciente demanda de combustible para satisfacer la igualmente creciente producción de tanques militares. Los nuevos tanques están provistos de motores radiales enfriados por aire. Para su funcionamiento se indican combustibles con índices octano de 80 y 91. Bueno es añadir aquí que el ejército nacional ha publicado recientemente una lista de características relativa a un combustible para todo fin, que tiene un índice octano de 80, según el método de la A.S.T.M. Sólo los procedimientos sintéticos podrán satisfacer adecuadamente estos crecientes requisitos.

Sobre la industria se están haciendo nuevas demandas para la producción de productos tales como tolueno, materiales básicos para hacer

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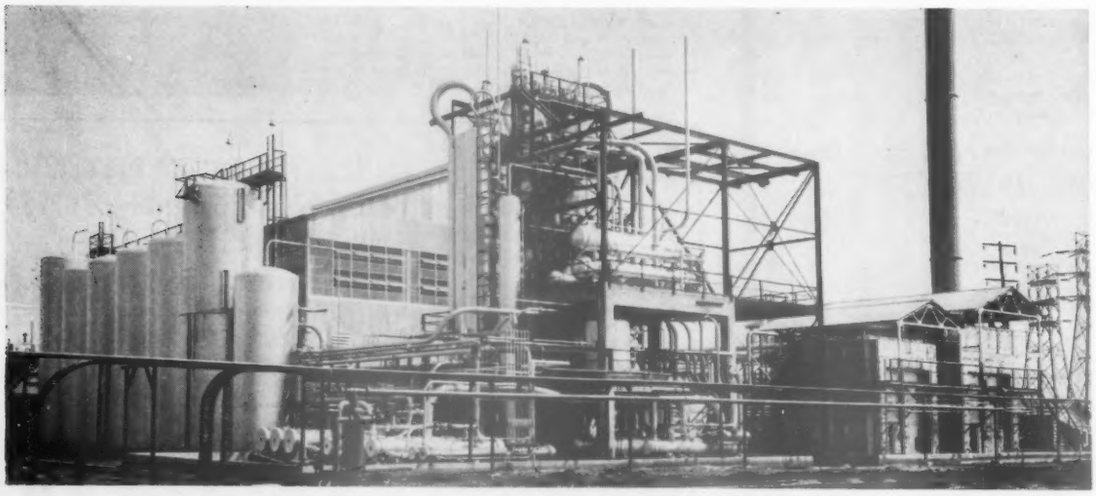

***New unit built at Houston, Tex., refinery of Sinclair Refining Co., for removing and refining petroleum wax by use of solvents.***

***Nuevo grupo instalado en la refinería de la Sinclair Refining Co. en Houston, Texas, para quitar y refinar parafina de petróleo mediante solventes.***

# Foreign Operators

# H.C. SMITH ROCK BITS

Cross section cutters have plow teeth at inner ends with annular teeth at outer ends to give good traction and to eliminate rounding off at outer ends of cross cutters. Requires little weight and reduces hole drift.

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Las fresas transversales tienen dientes de arado en los extremos interiores y dientes anulares en los extremos exteriores, para dar mejor tracción y eliminar la redondez en los extremos exteriores de las fresas transversales. Se requiere poco peso y se reduce la desviación del agujero.

## H C Smith Oil Tool Co.

GENERAL OFFICES AND PLANT - P. O. BOX 431, COMPTON, CALIF.

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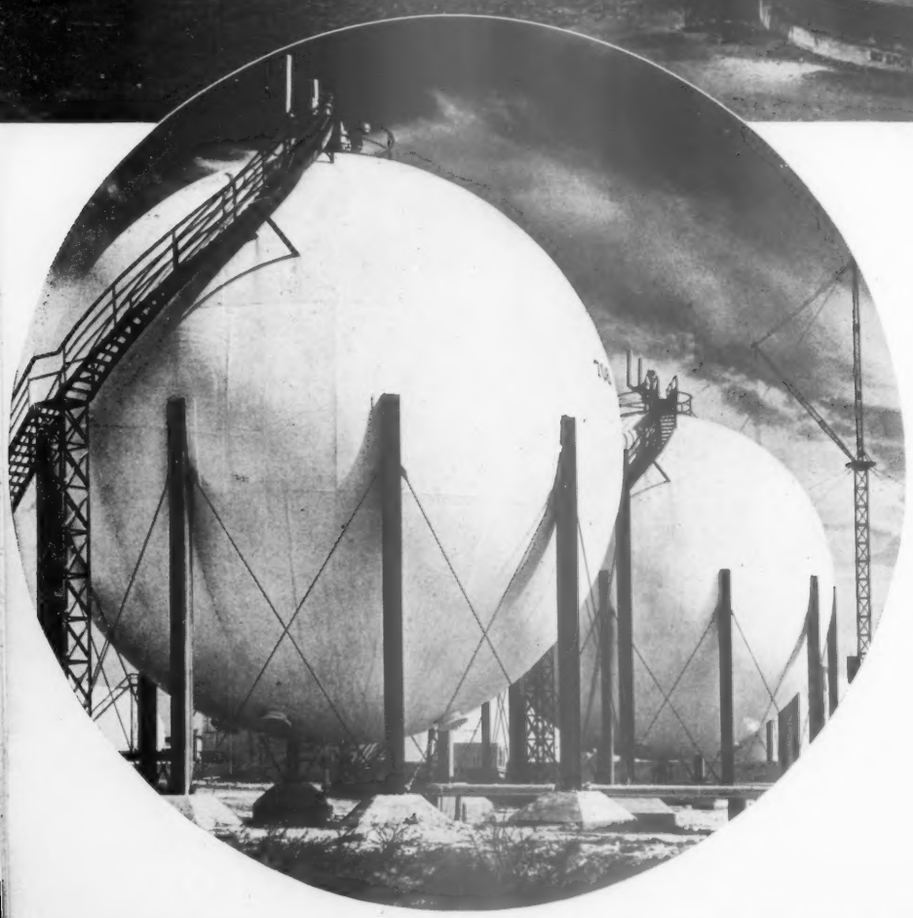
# Modern Oil Storage

## (EQUIPO MODERNO PARA ALMACENAR PETROLEO)



● La lámina precedente muestra algunos de los veintidós Hortonspheroids (Esferoides Horton) que se encuentran instalados en una refinería de las Antillas, todos los cuales se usan para almacenar gasolina. Estos esferoides tienen capacidades de 80.000 y 100.000 barriles, respectivamente, y están diseñados de suerte que puedan resistir una presión interna de 5 libras y 2½ libras por pulgada cuadrada, respectivamente. Las dos Hortonspheres (Esferas Horton) que se muestran a la izquierda son construcciones de 52 pies de diámetro, instaladas en la misma refinería con el fin de almacenar naftas ligeras a presión de 20 a 35 libras por pulgada cuadrada.

## Designed to Combat Evaporation Loss!

## Destinado a Combatir las Pérdidas Debidas a la Evaporación

# CHICAGO BRIDGE

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*In Canada:* HORTON STEEL WORKS, LIMITED, FORT ERIE, ONTARIO

# Equipment . . .

**EL WIGGINS BALLOON ROOF** (Techo Wiggins de Globo) convierte en práctico y lucrativo el principio del techo respirador al aplicarse a los tanques de almacenaje corriente chicos que no se conservan siempre llenos.

**EL HORTONSPHEROID** (Esferoide Horton) se usa muy generalmente en capacidades hasta de 30.000 barriles como recipiente de almacenaje bajo presión, para presiones hasta de 30 libras por pulgada cuadrada. Se usa también en tamaños mayores para manejar combustibles de alta potencia para motores, a presiones desde 2½ hasta 40 libras por pulgada cuadrada.

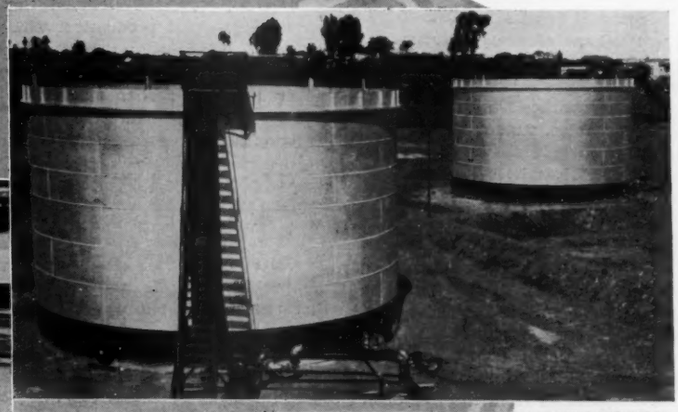
**EL WIGGINS BREATHER ROOF** (Techo Wiggins Respirador) rara vez se iguala por cuanto a la utilidad que rinde en los tanques de almacenaje corriente, de diámetro de 60 pies o más, que se mantienen llenos o casi llenos la mayor parte del tiempo.

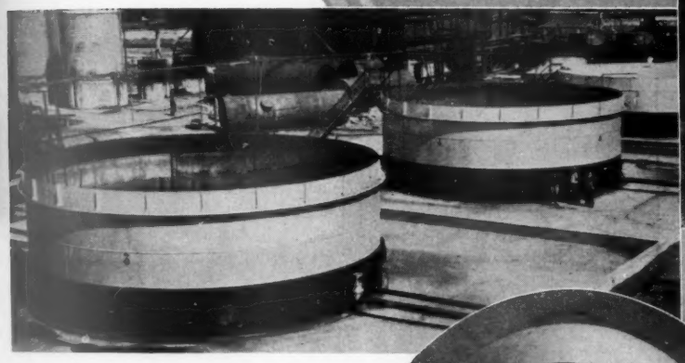
**EL WIGGINS PONTOON ROOF** (Techo Wiggins de Pontón) se usa en todas partes del mundo como dotación normal para los tanques de uso corriente en que se manejan productos de petróleo que no hierven a presiones atmosféricas ordinarias.

**LA HORTONSPHERE** (Esfera Horton) es un recipiente moderno para almacenar bajo presión, que se encuentra disponible en capacidades de desde 1.000 hasta 20.000 barriles, para presiones desde 25 hasta 250 libras por pulgada cuadrada.

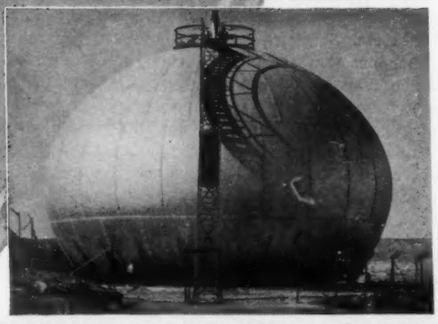
**EL WIGGINS BALLOON** (Globo Wiggins) es una construcción más grande, cuyo fin es el de servir como recipiente central para gases en las instalaciones para la preservación de los vapores o emanaciones, que se usan para grupos de tanques conectados universalmente entre sí por medio de tuberías herméticas contra las fugas de los gases.

**ARGENTINA**—La Compañía Nativa de Petróleos, S. A. usa Techos Wiggins de Pontón en los tanques de almacenaje para petróleo *(derecha)* y en los tanques de refinería *(abajo)* en su refinería de Campaña.



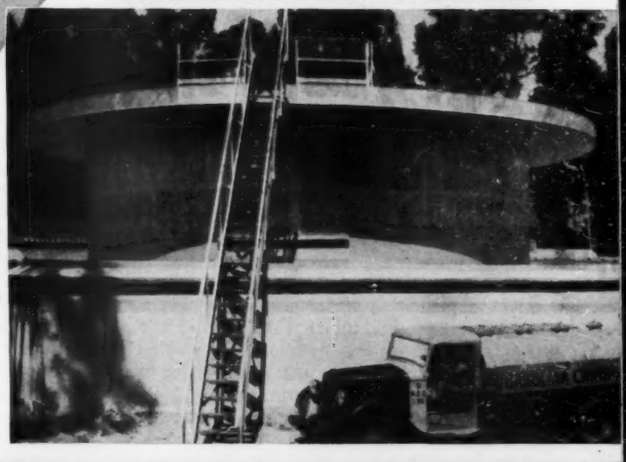


**PERU**—A la derecha se muestra un Hortonspheroid (Esperoide Horton) de 10.000 barriles construído para la Lobitos Petroleum Co., de Lobitos, Perú.



**VENEZUELA**—La Hortonsphere que se muestra a la derecha se usa para almacenar gas natural a presión de 50 libras por pulgada cuadrada, para el servicio de Maracaibo, Venezuela. La lámina de abajo muestra un Hortonspheroid de 2.500 barriles construído para la Anglo Ecuadorian Oil Fields, Ltd, en La Libertad, Ecuador.

**ECUADOR**—A la derecha se ve un tanque de 5.710 barriles para gasolina para motores, provisto de un Techo Wiggins de Globo, instalado en una estación para ventas al por mayor en Quito, Ecuador.



# & IRON COMPANY

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pointed out that the Army has recently published a specification for an all-purpose fuel having an octane number of 80 by the A.S.T.M. method. Only the synthetic processes can adequately supply these growing demands.

New calls are being made on the industry for the production of such items as toluene, basic materials for making synthetic rubber, special solvents, alcohols and numerous other normally nonpetroleum products.

## Hydrocarbon Synthesis

The manufacture of synthetic chemicals from natural gas and refinery vapors continues to gain in scope. A wide variety of products is made now, and many more items are in the process of development, including butadiene, unsaturated alcohols, glycerol and its derivatives. Coordinated as an important step in the synthesis of new products from petroleum is the development of heat-resisting steel alloys. Without them the synthesis of toluene, rubber substitutes, ammonia, etc., from petroleum would not be possible on a commercial scale.

The pressing needs for ammonia used in producing nitric acid for the manufacture of explosives serves as an example. Natural gas is passed over brick checker-work at temperature of 2,000° F., yielding a gas containing 70 per cent hydrogen. Most of the carbon content of the natural gas is converted to the solid form and is separated from the hydrogen mixture by washing with water and by elctrical precipitation. Of the other reaction products, carbon dioxide is removed by washing with water and alkali; nitrous oxide by passage over iron oxide; naphthalene and benzene by washing with oil; and methane, ethylene and acetylene by low-temperature fractionation, in the last stage of which liquefied atmospheric nitrogen is introduced to aid in the removal of carbon monoxide by fractionation, and to form a hydrogen-nitrogen mixture in the molecular proportions of ammonia. The synthesis is effected under high pressure, the last traces of carbon monoxide and oxygen being removed in the plant. The ammonia comes out as a gas ready for liquefaction or conversion into ammonium sulfate. Also, a means has been found to use acid sludge from petroleum refining to convert the ammonia to ammonium sulfate.

In the present national emergency, the production of alcohols from olefins has gained in importance. In the general process, the first step is to prepare the pure hydrocarbon fraction containing only the olefin and its corresponding paraffin. The olefin is absorbed in concentrated sulfuric acid from alkyl hydrogen sulfates and dialkyl sulfates. These products are next separated from unreacted hydrocarbons; alcohols or ether are made by hydrolysis in a dilute sulfuric acid solution. The alcohols and ethers are recovered from the solution by distillation and are subsequently purified by fractionation.

Isopropyl alcohol and diisopropyl ether, secondary butyl alcohol and tertiary butyl alcohol are made from propylene, butylenes, and isobutylene, respectively. Acetone is made from isopropyl alcohol, and methyl ethyl ketone from secondary butyl alcohol, by catalytic dehydrogenation and subsequent fractionation. Many other ketones and esters are produced from these basic products. A wide variety of products can be made from ethylene, such as ethyl alcohol, glycol, and glycol ethers.

It is important to note that all of these products of synthesis originate with a relatively few fractions produced in the normal refining of crude. It also may be noted that these same fractions are widely used for the synthesis of high-octane-number aviation fuel. These multiplied demands already exceed the normal segregated production. This fact could bring about the development of specific units to break down the crude oil in such a manner as to produce greater quantities of these gaseous fractions.

## Metals and Alloys

The subject of metals and alloys, always an interesting one to the refiner, has developed a new angle. The problem now is not so much what type to use but whether any can be most readily obtained. The defense requirements for common steel are such that none can be obtained for many purposes. The alloying elements, which in many cases are rare and produced in distant countries, are even more difficult to obtain so that alloy steels of certain properties cannot be had. However, despite the scarcity of certain materials, great interest remains in the question of the use of proper metals and alloys for the severe services encountered in refinery operation.

High-temperature operation requiries that metal used in such service should have the mechanical strength to withstand forces acting upon it and should be resistant to oxidation and corrosion. Another factor the metal should show is adequate creep strength or resistance to creeping. Alloying elements are added to steel to improve its properties along one or more lines. The service to which the part is to be subjected determines the choice.

Chromium is probably the most useful element normally used to protect equipment against corrosion when the alloy is in high temperature service. It has the property of forming a closely adhering scale of oxide or sulfide which acts as a barrier to further attack.

Molybdenum, when alloyed with steel, has a pronounced effect upon the creep resistance and is used in equipment operating at temperatures above 700° F. It is added to chromium alloys to inhibit temper brittleness and to improve creep resistance. It is also used in chromium-nickel alloys to improve corrosion

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caucho sintético, disolventes especiales, alcoholes y numerosos otros productos normalmente no petroleros.

## Síntesis del hidrocarburo

La manufactura de substancias químicas sintéticas de gas natural y de vapores de refinería continúa extendiéndose en radio de acción. Se hace ahora una gran variedad de productos, y muchos otros están en vía de desarrollo, incluyéndose entre éstos el butadiendo, alcoholes insaturados, glicerol y sus derivados. Coordinado como un importante paso en la síntesis de los nuevos productos de petróleo se encuentra el desarrollo de aleaciones de acero resistentes al calor. Sin ellas, la síntesis del tolueno, caucho sintético, amoniaco, etc., utilizando petróleo, sería imposible sobre una escala comercial.

La urgente necesidad de amoniaco para la producción de ácido nítrico utilizado en la fabricación de explosivos, es un ejemplo típico. El gas natural se pasa por un receptáculo de ladrillo a una temperatura de 2000 grados F. y se produce así un gas que contiene 70% de hidrógeno. La mayor parte del contenido de carbono del gas natural queda convertido a forma sólida y se separa de la mezcla de hidrógeno mediante lavado con agua y precipitación eléctrica. De los otros productos de lareacción, el bióxido de carbono se quita por lavado con agua y álcali; el óxido nitroso por paso sobre óxido de hierro; la naftalina y bencina, por lavado con petróleo; y el metano, etileno y acetileno, por fraccionación a baja temperatura, en cuya etapa final se introduce nitrógeno atmosférico en forma líquida, para ayudar en la remoción del monóxido de carbono por fraccionación, y para formar una mezcla de hidrógeno y nitrógeno en las proporciones moleculares del amoniaco. La síntesis se efectúa bajo alta presión y los últimos indicios de monóxido de carbono y oxígeno se quitan en la refinería. El amoniaco sale en la forma de un gas, listo para su liquificación o conversión en sulfato de amoniaco. También, se ha descubierto un medio para usar lodo de ácido de la refinería de petróleo en la conversión de amoniaco en sulfato de amoniaco.

En la presente crísis nacional, la producción de alcoholes de olefinas ha ganado en importancia. En el procedimiento general, el primer paso es preparar la fracción de hidrocarburo puro, que contiene sólo la olefina y su correspondiente parafina. La olefina es absorbida en ácido sulfúrico concentrado, formándose sulfatos de hidrógeno y otros productos, los cuales son después separados de los hidrocarburos sin reacción los alcoholes o éteres se hacen por hidrolisis en un ácido sulfúrico diluido. Los alcoholes y éteres se recobran de la solución por destilación y después se purifican por fraccionación.

El alcohol isopropilio y el éter diisopropilio, alcohol butilio secundario y alcohol butilio terciario se hacen de propileno, butilenos e isobutilenos, respectivamente. La acetona se hace de alcohol isopropilio, y la ketona de metilio y etilio, de alcohol butilio secundario, por deshidrogenación catalítica y subsiguiente fraccionación. Muchas otras ketonas y éteres se producen de estos productos básicos. Una gran variedad de productos puede hacerse del atileno, tales como alcohol etilio, glicol y éteres de glicol.

Es importante observar que todos estos productos de síntesis se origina con un número relativamente pequeño de fracciones producidas en la refinación normal del petróleo crudo. También es interesante observar que estas mismas fracciones se emplean mucho en la síntesis de combustible de aviación de alto índice octano. Estas multiplicadas demandas sobrepasan ya la producción normal segregada. Este hecho podría introducir el desarrollo de instalaciones específicas para separar el petróleo crudo de modo que se produjiera una mayor cantidad de estas fracciones gaseosas.

## Metales y aleaciónes

El tema de metales y aleaciones, siempre uno de particular interes para los refinadores, presenta ahora un nuevo ángulo. El problema actualmente no es qué tipo usar, sino encontrar un tipo cualquiera que pueda usarse. Los requisitos de la defensa nacional, en materia de acero común, son tan urgentes, que para muchos fines no se puede conseguir ninguna clase de acero. Los elementos de aleación, que en muchos casos son raros y se producen en países lejanos, son todavía más difíciles de conseguir en estos momentos de modo que no hay al presente acceso a aleaciones de acero de ciertas propiedades. Sin embargo, a pesar de la carestía de ciertos materiales, continúa muy vivo el interes en el uso de metales y aleaciones de adecuadas propiedades para resistir la severidad del servicio que se les presenta en los trabajos de refinería.

El trabajo a alta temperatura requiere que el metal usado en semejante servicio tenga la resistencia mecánica para aguantar las fuerzas que actúan sobre él y sea también resistente a la oxidación y corrosión. Los elementos de aleación se agregan al acero para mejorar sus propiedades en uno o varios sentidos. El servicio a que está sometida la pieza determina la elección del tipo de acero.

El cromo es probablements el elemento más útil de los que por lo general se usan para proteger el equipo contra la corrosión cuando la aleación queda sometida a servicio a alta temperatura. Tiene la propiedad de formar una costra muy adherida de óxido o sulfato, la cual tiene el efecto de una protección contra adicional ataque.

El molibdeno, en aleación con el acero, tiene un efecto muy pronunciado sobre la resistencia en general,

*(Continue en Pagina 231)*

## ¿Por que compra BUENOS RESULTADOS en equipo de bomba, dejando que la Byron Jackson a cargo de los detalles?

# Why not buy PUMPING RESULTS — and let Byron Jackson take care of the Details?

1. Las bombas Byron Jackson Multiplex son ideales para el servicio de petróleo frío o caliente donde las capacidades llegan a 75.000 barriles al día, con presiones hasta de 1.200 libras por pulgada cuadrada.

2. Para alta capacidad, contra columnas hidráulicas bajas o medianas, las bombas de refinería Byron Jackson VC (de aspiración simple de dos etapas) manejan de 40 a 6.000 galones por minuto o temperaturas que llegan hasta 850 grados F. y columnas hidráulicas que alcanzan hasta 900 piés.

3. Introducidas por la Byron Jackson Co. en 1901, y desde entonces, constantemente perfeccionadas, las turbobombas Byron Jackson Deepwell suministran grandes rendimientos, funcionamiento exento de irregularidades y servicio de bajo costo, en la extracción de agua de pozos perforados, lagos, ríos y otras fuentes de abastecimiento. Se ofrecen en varios modelos y en varios tipos de propulsión, para bombar de 25 a 10.000 galones por minuto, con columnas hidráulicas de 50 a 800 piés. El grupo acquí ilustrado fué recientemente instalado en la famosa planta de estabilización, recuperación de gasolina y mantenimiento de presión de Vile Platte, de la Continental Oil Company.

4. La bomba Byron Jackson OL Multiplex se adapta a bombar petróleo donde las capacidades se comprenden en una escala de 250 a 2.000 galones por minuto, con columnas hidráulicas de 600 a 2.800 piés.

5. Donde el servicio es mecánica o hidráulicamente severo, se recomiendan las bombas de petróleo caliente Byron Jackson de DOBLE ASPIRACION o succión. Escala de capacidad de 600 a 3.000 galones por minuto; escala de columnas hidráulics de 200 a 800 piés.

6. Las bombas Byron Jackson PUP son modelos centrífugos, que satisfacen todos los requisitos de un equipo portátil práctico. Se caracterizan por gran adaptación, firmeza, economía en costo inicial y gastos de funcionamiento, peso liviano y gran rendimiento. La bomba PUP funciona con gas natural, gasolina o destilado, y se suministra unicamente como grupo de bombar (ilustrado), con montaje en remolque de dos a de cuatro ruedas. Aplicaciones: Toda clase de servicio provisional o de trabajo semi permanente. Escala de capacidad: de 100 a 600 galones por minuto. Escala de columna hidráulica: de 100 a 1.000 piés.

7. La Byron Jackson SUMERGIBLE es un grupo de bombar, que comprende un motor eléctrico montado debajo de una turbobomba de pozo profundo, a la cual está acoplado directamente. Tanto el motor como la bomba funcionan completamente sumergidos en el agua. La corriente eléctrica se envía de la superficie al motor sumergido, mediante un cable de tipo submarino. La SUMERGIBLE no tiene igual en seguridad, rendimiento y economía en conexión con la extracción de agua de pozos perforados. El largo árbol, común a las bombas ordinarias de este tipo, se has suprimido en el presente caso, y con esto se evita el desperdicio de fuerza y las prematuras reparaciones y repuestos, debido a la rotación de un largo árbol en muchos cojinetes.

La SUMERGIBLE se ofrece para instalación en pozos de diámetro interior mínimo de 6 a 16 pulgadas. Suministra de 50 a 5.000 galones por minuto, y desarrolla de 5 a 350 caballos de fuerza.

8. La HYDROPRESS se recomienda para servicio de refinería de petróleo frío o caliente, de baja capacidad y de alta columna hidráulica, para trabajo de represión y similares requisitos, en que las capacidades son de 10 a 200 galones por minuto contra columnas hidráulicas que llegan hasta 7.000 piés.

9. Aceptadas como las mejores de su clase, las bombas Byron Jackson DOUBLE CASE para la carga de petróleo caliente, se ofrecen en un tipo de presión mediana, para máxima columna hidráulica de 2.000 piés, y en un tipo de alta presión, para máxima columna hidráulica de 10.000 piés, para el manejo de 150 a 2.000 galones por minuto.

10. Este es una nueva bomba, sin empaquetadura ni prensaestopas, para propano, butano y otros líquidos muy volátiles. Solicite el boletín relativo a la bomba Byron Jackson STUFFING-BOXLESS.

11. Las bombas Byron Jackson BILTON se usan mucho para el servicio de bombar líquido frío o caliente. La bomba está unida a un motor de inducción, formando un grupo relativamente pequeño, que se adapta al funcionamiento en posición horizontal, inclinada o vertical. El árbol es común para la bomba y el motor, ahorrándose así espacio y la necesidad de emplear un acoplamiento flexible. Escala de capacidad: modelo de una etapa, de 10 a 1.500 galones por minuto; modelo de los etapas, de 40 a 300 galones por minuto. Escala de columnas hidráulics: modelo de una etapa, de 10 a 300 piés; modelo de dos etapas, hasta 500 piés.

12. Bombas Process, tipo SM, son modelos centrífugos de una etapa, proyectados especialmente para uso en trabajos en que las temperaturas y presiones son muy altas, y para otros diversos servicios que presentan requisitos muy severos. La vista de arriba muestra cómo todo el grupo de bomba se quita de la caja sin perturbar la tubería o propulsión. Aplicaciones: petróleo caliente, propano, butano, gasolina caliente y servicios similares. Capacidades de 40 a 1000 galones por minuto. Escala de 25 a 600 piés. Boletín de 12 páginas ilustrado enviado a solicitud.

1. Byron Jackson Multiplex Pumps are ideal for cold or warm oil service when capacities range to 75,000 barrels per day; pressures to 1,200 lbs. per square inch.

2. For high capacity against low or medium heads, Byron Jackson VC Refinery Pumps (of two stage single-suction design) handle from 40 to 6,000 g.p.m. at temperatures to 850° F., and heads to 900 feet.

3. Pioneered by Byron Jackson Co., in 1901, and constantly improved, Byron Jackson Deepwell Turbine Pumps provide high efficiencies, trouble-free operation and low-cost service in pumping water from bored wells, lakes, rivers or other sources of supply. Various designs, for several types of drives, are available for pumping from 25 to 10,000 g.p.m. at heads from 50 to 800 feet. The unit pictured recently was installed at Continental Oil Company's record-breaking Ville Platte Stabilization, Gasoline Recovery and Pressure Maintenance Plant.

4. The Byron Jackson OL Multiplex is suited to general high head oil pumping where capacities range from 250-2,000 g.p.m., and heads from 600-2,800 feet.

5. Where service is mechanically or hydraulically severe, Byron Jackson DOUBLE SUCTION Hot Oil Pumps are recommended. Capacity range 600-3,000 g.p.m.; head range 200-800 feet.

6. Byron Jackson PUP Pumps are centrifugal Pick-Up Pumps which meet all the requirements for portable pumping units which combine Flexibility, Sturdiness, Low Initial and Low Operating Costs, Light Weight, and High Efficiency. The PUP operates on natural gas, gasoline or distillate, and is furnished as a pumping unit only (illustrated); with 2-wheel trailer or 4-wheel trailer mounting. Applications: All classes of pick-up service or for semi-permanent installations. Capacity Range: 100 to 600 g.p.m. Head Range: 100 to 1,000 feet.

7. The Byron Jackson SUBMERSIBLE is a close-coupled pumping unit made up of an electric motor mounted below a deepwell turbine pump to which it is direct-connected. Both motor and pump operate completely submerged in water. Electric power is delivered from the surface switchbox to the submerged motor through a submarine type cable. The SUBMERSIBLE is unequalled for the safe, dependable and economical pumping of water from bored wells. The conventional long shaft has been eliminated, thus avoiding wasted power and premature repairs and replacements due to rotation of the shaft in many bearings.

The SUBMERSIBLE is made for installation in wells having a minimum inside diameter from 6 to 16 inches; delivering from 50 to 5,000 g.p.m.; horsepower 5 to 350.

8. The HYDROPRESS is designed for low capacity, high head hot or cold refinery service, repressuring and similar requirements where capacities range from 10-200 g.p.m. against heads to 7,000 feet.

9. Acknowledged the Leader, Byron Jackson DOUBLE CASE Hot Oil Charging Pumps are made in a Medium Pressure Type for heads to 2,000 feet, and a High Pressure Type for heads to 10,000 feet, handling from 150-2,000 g.p.m.

10. Here's a new pump with No Packing and No Stuffing Boxes for propane, butane and all highly volatile liquids. Ask for Bulletin on the Byron Jackson STUFFING-BOXLESS Pump.

11. Byron Jackson BILTON Pumps are widely used for general cold or warm pumping service. The pump is close-coupled to an induction motor, making a compact integral unit which is adapted for operation in a horizontal, inclined or vertical position. The shaft is common to the pump and motor, thus saving both space and the use of a flexible coupling. Capacity Range: single stage, 10-1,500 g.p.m., two-stage, 40 to 300 g.p.m. Head Range: single stage, 10-300 feet, two-stage, up to 500 feet.

12. Type SM Process Pumps are single stage centrifugal pumps, designed specifically for use where temperatures or pressures may be very high, and for many other services involving severe requirements. View above shows how entire pump assembly is removed from case without disturbing piping or driver. Applications: Boiling Oil, Propane, Butane, Hot Gasoline and similar services. Capacities: 40 to 1,000 g.p.m.; Head Range: 25 to 600 feet. Illustrated 12-page Bulletin sent upon request.

**BYRON JACKSON CO., Export Office: 420 Lexington Ave., New York, N. Y., U.S.A. General Offices: LOS ANGELES, CALIF.; SALES OFFICES, Houston, Chicago**

*Established 1872*

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# ENSIGN

## LEADS THE FIELD IN OIL INDUSTRY ENGINE CARBURETION

All standard engine manufacturers supplying the Western Hemisphere oil industry, use and recommend ENSIGN Carburetion Equipment for Natural Gas, Butane-Propane and Gasoline fuels. ENSIGN Butane-Propane Carburetion Equipment saves on fuel costs and has many other advantages for internal combustion engines used in transportation units; ENSIGN Natural Gas Carburetors or ENSIGN Combination Natural Gas and Gasoline Carburetors have proved their efficiency for pumping engines; ENSIGN Carburetion using one, two or all three of the above fuels is unsurpassed for drilling and servicing engines. Write to our main office, Huntington Park, California for further details. A competent engineering staff and thirty years of carburetion experience are at your disposal.

Todos los fabricantes de motores de tipos normales que dan abastecimiento a la industria petrolífera del Hemisferio Occidental, usan y recomiendan el equipo de carburación ENSIGN para los combustibles de gas natural, butano-propano y gasolina. El equipo de carburación ENSIGN de butano-propano ahorra en gastos de combustible y tiene muchas otras ventajas para motores de explosión interna usados en vehiculos de transporte. Los carburadores ENSIGN de gas natural y los carburadores ENSIGN de combinación de gas natural y gasolina, han demostrada su gran utilidad en máquinas de bomba. La carburación ENSIGN, que usa uno, dos o los tres combustibles anotados arriba, no tiene rival en los motores de perforación y servicio general. Escriba a la oficina principal en Huntington Park, Calif., E.U.A. pidiendo información completa. A su disposición tenemos un competente cuerpo de ingenieros y trienta años de experiencia en la carburación.

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TRANSPORTE

PUMPING
TRABAJO DE BOMBA

DRILLING
PERFORACION

SERVICING
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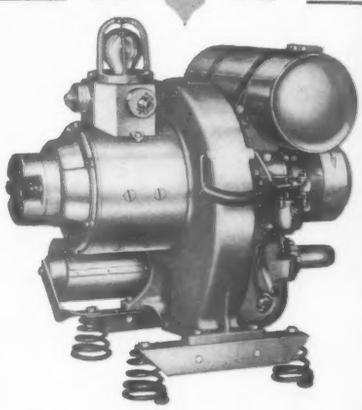
## FOR THE ARMS OF UNCLE SAM



Homelite has heard and answered the call for defense. Twenty-four hours a day — every day of the week — Homelite Portable Generators, Pumps and Blowers are pouring from production lines into the service of Armies and Navies of all countries defending democracy.

Defense demands for Homelite Units are great — so great that we can respect orders from our regular customers on a priority basis only. This is unfortunate — but not without compensation. Our increased manufacturing facilities and our marked product improvements will bear important profits for our regular customers in the normal times to come.

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# Thompson
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resistance to certain organic acids encountered in refining.

Nickel is valuable used in connection with chromium in high-temperature work. Chromium alloys rendered austenitic by addition of substantial quantities of nickel have the lowest creep rates at temperatures above 1,200° F.

Silicon in conjunction with other alloying elements improves resistance to sulfur attack and adds greatly to oxidation resistance.

Tungsten, like molybdenum, renders chrome steel less susceptible to temper brittleness and improves creep resistance.

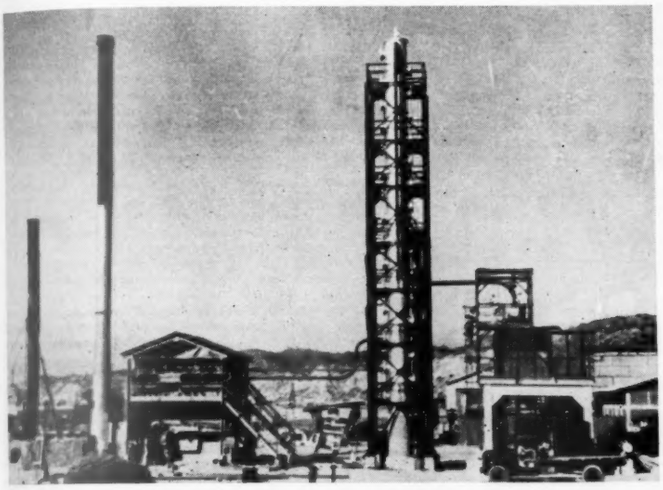
There are any number of combinations of alloying elements with steel that can be worked out to meet specific conditions. The numerous problems imposed by high or low temperatures, corrosion, oxidation, stresses, impact, or hydrogen penetration can be solved by the use of the proper alloy.

Protection against the corrosion of refinery equipment by lining with various resistant liners welded to the walls of ordinary carbon-steel vessels in preference to vessels fabricated of solid alloy steels has gained popularity. There are three methods for applying interior protection including welded sheet metal linings, spraying or metallizing, and the use of clad metals. Stainless-steel alloys, commercially pure nonferrous metals, and nonferrous alloys are used as claddings to produce corrosion protection. Cladding methods include casting on processes, pressure welding, fusion welding, and electric-resistance welding.

Metallizing is especially useful in rebuilding worn surfaces. Stainless steel sprayed on steel pump pistons not only protects the base metal from corrosion but from abrasive wear also. There are three new processes developed to protect iron and steel from scaling at elevated temperatures. In one process, a coat of aluminum is applied, over which a liquid seal is sprayed, and the article is then heat treated so that the aluminum and iron fuse together. The other processes employ a patented alloy. Such surfaces are said to be protection against normal atmospheres up to 2,000° F., as well as against sulfurous gas. Most of the common metals except chromium can be used for metal spraying by the wire process.

## Synthesis of Toluene

Toluene, as a part of one of the most widely used war explosives, is now available in large quantities from closely fractionated portions of reformed, light petroleum fractions. The normal production from coal is inadequate, so the refining industry has been called upon to augment the supply. Plants located at refineries include the one built by Shell and producing at the rate of 2,000,000 gal. a year, and the $12,000,000 unit built for the Government by Humble Oil & Refining Co. at Baytown, Tex., to make many times this quantity.



*Small, efficient skimming plants find ready application in many countries. Here is a new 1,000-bbl.-per-day plant built by the government at Zorritos, Peru.*

*Las pequeñas y eficaces instalaciónes de destilación primaria parcial tienen facil aplicación en muchos paises. Mostramos aquí una nueva instalación de 1.000 barriles al día construida por el Gobierno en Zorritos, Perú.*

There are some crude oils fairly rich in toluene which fraction can be recovered directly by fractionation and subsequent treatment. The potential volume from such a source is small. Other possible methods include the catalytic aromatization of normal heptane, thermal pyrolysis of cracked gases, and certain reactions involving high-temperature, low-pressure conditions.

The dehydrogenating reaction normally carried out in the hydroforming process to make gasoline produces a final material containing substantial proportions of aromatic and cyclic compounds. It normally contains from 5 to 8 per cent of toluene but it is possible to change the operation to produce much higher percentages.

It is reported that the Humble plant at Baytown will be supplied with aromatics from a hydroforming

*(Continued on Page 234)*

y se usa en equipos que trabajan a temperaturas superiores a 700 grados F. Se añade a aleaciones de cromo para reforzalecer el temple y mejorar la resistencia. También se usa en las aleaciones de cromo y níquel para mejorar la resistencia a la corrosión causada por ciertos ácidos orgánicos presentes en la refinación.

El níquel es valioso en conexión con el cromo, en trabajos expuestos a elevadas temperaturas. Las aleaciones de cromo austeniticadas por la adición de buenas cantidades de níquel tienen los más bajos regimenes de oxidación a temperaturas superiores a 1200 grados F.

El silicio, en combinación con otros elementos de aleación, aumenta la resistencia al ataque del azufré y también la resistencia a la oxidación.

El tungsteno, como el molibdeno, hace que la aleación de acero y cromo sea menos susceptible al debilitamiento del temple y mejora también la resistencia a la oxidación.

Hay numerosas combinaciones de elementos de aleación con acero que pueden hacerse para satisfacer condiciones específicas. Los numerosos problemas introducidos por las temperaturas altas y bajas, corrosión, oxidación, tensiones, golpes o penetración de hidrógeno, pueden resolverse mediante el uso de una aleación adecuada.

La protección contra la corrosión del equipo de refinería mediante revestimientos o forros resistentes soldados a las paredes de receptáculos ordinarios de aleación de acero y carbono, en lugar de receptáculos fabricados de aleaciones macizas de acero, ha ganado en popularidad. Hay tres métodos para la aplicación de protección interior y son los forros de lámina de acero soldados, la pulverización o metalización y el uso de metales revestidos. Los aleaciones de acero inoxidable, los metales no ferrosos comercialmente puros y las aleaciones no ferrosas se usan como revestimientos, para obtener protección contra la corrosión. Los métodos de revestimiento o recubrimiento incluyen el procedimiento de vaciado, la soldadura a presión, la soldadura de fusión y la soldadura de resistencia eléctrica.

La metalización es especialmente útil en la reconstrucción de superficies desgastadas. El acero inoxidable pulverizado en los émboles de acero de bombas no sólo protege al métal básico contra la corrosión, sino también contra el desgaste por rozamiento. Se han desarrollado tres procedimientos nuevos para proteger el hierro y el acero contra la escamaderua a elevadas temperaturas. En un procedimiento, se aplica una capa de aluminio, sobre la cual se rocía un cierre líquido. El artículo se somete después a tratamiento por calor, para fundir juntos el aluminio y el hierro. Los otros procedimientos emplean una aleación patentada. Se dice que semejantes superficies son protección contra temperaturas normales hasta 2000 grados F., lo mismo que contra los gases sulfurosos. Casi todos los metales comunes, exceptuando el cromo, pueden usarse para la metalización o pulverización por el procedimiento de alambre.

## Síntesis del tolueno

El tolueno, como una parte de uno de los explosivos de mayor uso en la guerra, se obtiene ahora en grandes cantidades de las fracciones finamente fraccionadas de las fracciones livianas reformadas del petróleo. La producción normal desprendida del carbón es inadecuada, y por esta razón se ha llamado a la industria de la refinería de petróleo para que aumente el abastecimiento. Entre las instalaciones anexas a las refinerías se incluye la construida por la Shell, con producción a razón de 2.000.000 de galones al año, y ultimamente, la Humble Oil and Refining Company ha construido una instalación que cuesta como 12 millones de dólares, para el Gobierno, en Baytown, Texas, que producirá varias veces más esa cantidad anual.

Hay ciertos petróleos crudos con buena cantidad de tolueno, cuya fracción puede recuperarse directamente por fraccionación y consiguiente tratamiento. La cantidad potencial de semejante fuente es pequeña. Otros métodos posibles son la aromatización catalítica del heptano normal, la pirolisis termal de los gases de cracking y ciertas reacciones en que se comprenden condiciones de alta temperatura y baja presión.

La reacción deshidrogenante normalmente efectuada en el procedimiento de hidroformación para hacer gasolina, produce un material final que contiene apreciables proporciones de composiciones aromáticas y cíclicas. Normalmente contiene de 5 a 8 por ciento de tolueno pero es imposible alterar la operación para obtener mayores porcentajes.

Se dice que la instalación Humble en Baytown recibirá abastecimiento de aromáticos de un grupo de hidroformación, y que como 27.000.000 de galones al año de tuluol se separarán y aprovecharán ventajosamente. Otros grupos de hidroformación activos o en vía de construcción, aumentarán mucho esta fuente potencial.

## Caucho de petróleo

Uno de los principales productos importados a este país es el caucho. Debido a su indispensabilidad y en vista del peligro de que se cierren las fuentes de abastecimiento en el extranjero, se está dando gran atención a la manufactura de substitutos en el país. Actualmente se están produciendo varios tipos de caucho sintético en cantidades comerciales. Esto es de especial interes para las refinerías, pues todos los materiales básicos que se utilizan son derivados potenciales de petróleo.

Los varios productos pueden clasificarse en 4 grupos. El primero empieza con la diolefina y produce caucho natural (isoprene), Buna (butadiene) y caucho de metilio (dimetilbutaniene). El segundo grupo empieza con el cloroprene, y posiblemente con modificadores, produce

*(Continue en Pagina 234)*

# CONTROLLED VERTICAL D

## CONTROLLED VERTICAL DRILLING METHODS EXPLAINED

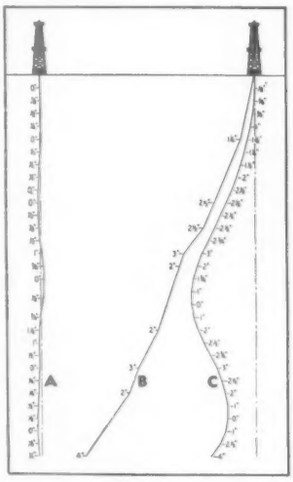
Controlled vertical drilling is the practice of confining the entire course of the hole within close limits of a vertical line, regardless of its depth. An example of a well drilled by controlled vertical drilling methods with the aid of a Totco Recorder, plotted from a well log, is shown at A in the diagram.

The successful application of controlled vertical drilling depends upon frequently and accurately determining the effect of the drilling weight upon the bit by checking the angle of the hole just drilled with a precision Recording Instrument so that any slight tendency of the hole to deviate can be immediately halted while the angle is very small. The driller must think in terms of the present record on bottom as compared with the record immediately above it, and the records must be very accurate or he will not really know whether the angle is increasing, decreasing, or remaining the same. Totco records are taken each time a joint of drill pipe is added, or not farther apart than from 50 to 100 feet.

At small angles, the natural plumb bob tendency of the drill string, when in tension and rotated with lighter drilling weight, will quickly straighten the hole in any formation. Then, when the angle is broken, the full amount of weight for most efficient cutting can again be safely applied. This process is repeated continually, with the result that the well is confined to a course that is for all practical purposes vertical. Angles are never allowed to increase to the point where the well establishes a definite directional trend at increasing angles; mechanical means of controlling the course of the hole are therefore unnecessary.

The result of lack of systematic control is shown in B and C of the diagram. The assumed course of the well is shown at B, while the actual course, analyzed from a directional survey, is shown at C. The two serious "dog-legs" which resulted from lack of properly applied control during drilling could have been avoided had Totco records and controlled vertical drilling methods been utilized.

The Totco Recorder was developed especially for use in controlled vertical drilling and has been employed successfully by major operators and drilling contractors in the United States and all foreign countries for years. Its use effects a substantial saving of time, equipment cost, drilling expense, and greatly reduces the number of fishing jobs and mechanical troubles.




## EXPLICACION DE LOS METODOS DE PERFORACION VERTICAL CONTROLADA

La perforación vertical controlada es la práctica de confinar el curso completo del agujero dentro de límites exactos de una línea vertical, independientemente de la profundidad. Un ejemplo de un pozo perforado según los métodos de perforación vertical controlada con la ayuda de un registrador Totco, basado sobre un registro diario de perforación, se muestra en A en el diagrama.

La aplicación satisfactoria de la perforación vertical controlada depende de la determinación frecuente y exacta del efecto de peso de la perforación sobre la barrena, mediante la verificación del ángulo del agujero recientemente perforado, con un instrumento registrador de gran precisión, de modo que cualquiera leve tendencia del agujero hacia desviarse pueda evitarse inmediatamente mientras el ángulo es todavía muy pequeño. El perforador debe pensar en los términos del presente registro en el fondo, en comparación con el registro inmediatamente arriba de ese punto, y los registros deben ser muy exactos, pues de lo contrario, no podrá realmente saber si el ángulo está aumentando, disminuyendo o quedando lo mismo. Las acusaciones con el Totco se toman cada vez que se agrega una sección de tubo de perforación, o con no más separación de 50 a 100 pies.

A ángulos pequeños, la tendencia natural de la plomada de la columna de perforación, cuando está bajo tensión y es girada con más liviano peso de perforación, endereza rapidamente el agujero en cualquiera formación. Luego, cuando el ángulo se aparta, la cantidad completa de peso para el corte más eficaz podrá de nuevo aplicarse con seguridad. Este procedimiento se repite continuamente, con el resultado de que el pozo se confina a un curso que para todo fin práctico es vertical. Nunca se permite que los ángulos aumenten hasta el punto en que el pozo establezca una definida tendencia direccional a ángulos crecientes. No hay, por lo tanto, necesidad de valerse de medios mecánicos para controlar la dirección del agujero.

El resultado da la falta de control sistemática se muestra en B y C en el diagrama. El curso asumido del pozo se muestra en B, mientras que el verdadero curso, analizado por un estudio direccional, se muestra en C. Las dos serias desviaciones que resultaron de esta falta de control debidamente aplicado durante la perforación pudieron evitarse si se hubieran utilizado las acusaciones con el Totco y los métodos de perforación vertical controlada.

El registrador Totco fué perfeccionado especialmente para usarse en la perforación vertical controlada y ha sido empleado con éxito por importantes empresas petroleras y perforadores de pozos en los Estados Unidos de América y el extranjero, desde hace muchos años. Su uso efectúa una gran economía en tiempo, costo de equipo, gastos de perforación y por otra parte reduce mucho el número de trabajos de salvamiento e irregularidades mecánicas.

## OPERATED BY REGULAR DRILLING CREWS

The Totco Recording Instrument consists of the recording element and the angle indicator, both completely enclosed and factory sealed. The Recording Instrument is encased in a go-devil (two styles are shown at A and B at left) which is run through the drill pipe on a measuring or sand line, or is dropped in the pipe and recovered when the drill string is pulled out. The go-devil completely shields the Instrument from fluid, dirt, and shock.

The Totco Recorder is entirely mechanical, and does not employ liquids, chemicals or electrical apparatus, hence, its operation is unaffected by climatic conditions and well temperatures. Any member of the drilling crew can operate it. The work of inserting the chart, putting the instrument in the go-devil, and starting the go-devil down the drill pipe can be done in one minute. The record is made on a small graduated composition disc and is immediately available to the driller within a few seconds after the go-devil is brought to the surface. The instrument records the angle of inclination precisely, and the record is read easily to 1/8 of one degree. The accuracy of the timing element permits the record to be taken with a stop on bottom not exceeding 30 to 45 seconds.

Enameled steel equipment box and operating supplies for Totco Recorder. Recorder Instrument is shown in its felt-lined hardwood case. Batteries are for chart reading lamp; they are a part of the instrument.

Caja de acero esmaltado para el equipo y abastecimiento de trabajo para el registrador Totco. El instrumento registrador se muestra en su caja de madera dura con forro de fieltro. Las baterías son para la lámpara empleada para leer los registros, y no forman parte del equipo.

## MANEJADO POR LOS MISMOS OPERARIOS

El instrumento registrador Totco consiste en un elemento de registro y un indicador de ángulo, ambas cosas completamente tapadas y selladas en fábrica. El instrumento registrador se coloca en un go-devil (a la izquierda se muestran dos estilos en A y B) el cual pasa por el tubo de perforación en un cable de medición o de bomba, o bien es introducido en el tubo y recuperado cuando sale afuera la columna. El go-devil da al instrumento completa protección contra el liquido, tierra y choque.

El registrador Totco es completamente mecáncio, y no emplea líquidos, substancias químicas o aparatos eléctricos. Por esta razón, su funcionamiento no es afectado por condiciones de clima, o temperaturas en el pozo. Cualquier miembro de la cuadrilla de perforadores puede manejarlo. El trabajo de insertar la tabla o gráfico, colocar el instrumento en el go-devil y bajar el go-devil por el tubo de perforación, puede hacerse en un minuto. El registro se hace en un disco pequeño graduado, de composición a propósito, y queda inmediatamente a la disposición del perforador dentro de pocos segundos a continuación de la salida del go-devil a la superficie. El instrumento registra el ángulo de inclinación con precisión, y el registro se lee fácilmente hasta ⅛ de grado. La exactitud del elemento indicativo de tiempo permite que la acusación de haga con una parada al fondo que no pase de 30 a 45 segundos.

# DRILLING METHODS

## TOTCO RECORDERS are sold for use in ALL COUNTRIES

Hundreds of Totco Recorders are in daily use in the oil fields of the United States and foreign countries. The same Totco recording instrument fits all types of Totco go-devils. The go-devil equipment can be adapted for running on a light measuring line, a sand line, or in conjunction with any wire line coring equipment; or it can be dropped freely inside the drill pipe and retrieved with an ordinary wire line coring overshot or recovered when the drill string is pulled out of the hole. Total time required to take a Totco record at 5000 feet need not exceed 15 minutes, and duplicate runs are not required as the Totco Recorder is practically failure-proof when the simple instructions are followed.

Totco Recorders are sold outright in the United States and all foreign countries. They are available on a rental basis in the United States only.

## LOS REGISTRADORES TOTCO SE VENDEN PARA USO EN TODAS PARTES

Centenares de registradores Totco se usan a diario en los campos petroleros de los Estados Unidos de América y el extranjero. El mismo instrumento registrador Totco se adapta a todos los tipos de go-devil. El equipo de go-devil puede adaptarse para funcionar en un cable de medir, cable de bomba o en conjunción con cualquier cable de alambre de sacanúcleos. También puede bajarse libremente por dentro del tubo de perforación y sacarse con un overshot de sacanúcleos accionado por cable de alambre o recuperarse al salir del agujero la columna de perforación. El tiempo total que se requiere para tomar una acusación con un Totco a 5000 pies no pasa generalmente de 15 minutos, y no hay necesidad de duplicar las bajadas, pues el registrador es casi a prueba de falla cuando se siguen sus sencillas instrucciones.

Los registradores Totco se venden incondicionalmente en los Estados Unidos de América y en todos los países del extranjero. Se ofrecen en arriendo en los Estados Unidos de América unicamente.

## CONTINUOUS PERFORMANCE OF TOTCO RECORDERS INSURED BY THIS WORLD-WIDE GUARANTEE!

### GUARANTEE

All Totco Recorder Instruments sold in the United States and Foreign Countries are guaranteed for a period of one year, and will be repaired at our laboratory or replaced free of charge should they fail to operate or to maintain their accuracy, when run and cared for according to the instructions contained in the Totco Catalog and Operating Manual which accompanies each shipment.

TECHNICAL OIL TOOL CORPORATION, LTD.

### GARANTIZA

Todos los instrumentos registradores Totco vendidos en los Estados Unidos de América y el extranjero se garantizan por un período de un año y se repararán en nuestro laboratorio o renovarán gratuitamente en caso de que dejen de funcionar o de conservar su exactitud, cuando se les maneje y cuide de acuerdo con las instrucciones contenidas en el catálogo y manual de funcionamiento del Totco, que se incluye en cada embarque.

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Air mail makes Totco laboratory service quickly available to all owners of Totco Recorders. Special mailing tubes are included in each shipment to facilitate the return of the Recorder Instrument to our laboratory should the instrument require service at any time.

NOTE—We now have complete stocks of Totco Recorders and go-devil equipment available, and will attempt to keep the stocks at or near their present level. Requirements of the Defense effort, however, may restrict the quantity of new equipment manufactured in the future. Orders should be placed now to insure delivery.

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El servicio postal aéreo coloca el servicio de laboratorio Totco al rápido y fácil alcance de todos los dueños de registradores Totco. En cada embarque se incluyen tubos especiales de correo, para facilitar la devolución del instrumento registrador a nuestro laboratorio, en caso de que el instrumento requiera ajuste o reparación en cualquier momento.

NOTA—A la disposición de los interesados tenemos ahora una buena existencia de registradores Totco y equipo de go-devil, y trataremos de mantener esta existencia a su presente nivel. Los requisitos del programa de Defensa Nacional, sin embargo, podrá limitar la cantidad de nuevo equipo fabricado en el futuro. Los pedidos deben enviarse ahora para asegurar su entrega.

# TECHNICAL OIL TOOL CORP., LTD.

unit and that some 27,000,000 gal. a year of toluene will be separated and recovered. Other hydroforming plants now operating or building add to this potential source.

## Petroleum Rubber

One of the principal commodities imported into the country is rubber. Due to its indispensability and to the potential curtailment of foreign supplies a great deal of emphasis is placed on manufacturing substitutes at home. Numerous synthetic rubbers are now being made in commercial quantities. This is of special interest to refiners for all of the basic materials involved are potential petroleum dreviatives.

The various products may be classified into four groups. The first starts with diolefin and produces natural rubber (isoprene), Buna (butadiene), and methyl rubber (dimethylbutadiene). The second group starts with chloroprene, and possibly with modifiers, produces neoprene and Sonprene. The third group starts with diolefins plus modifiers and makes Buna S (butadiene plus styrene) and Perbuna or Buna N (butadiene plus acrylo styrene). Some other rubbers, such as Hycar and Chemigum, probably also fall into this classification. The last type starts with olefins plus diolefins and produces Butyl rubber. Thiokol is classified as a synthetic rubber but does not closely fit into the group. It is a condensation product of chlorine-containing organic compounds and sodium polysulfide.

The first synthetic rubber was made from isoprene, obtained from turpentine. Later it was found that butadiene, which is isoprene minus a methyl group, and dimethyl butadiene could be made into a rubber by heating in the presence of sodium. The product so formed was called Buna. A well-known product, Neoprene, is made by polymerizing chloroprene, which is isoprene with a chlorine atom in the position of the original methyl group.

Then a better method was found. It was discovered that when certain modifying agents were added to the butadiene and a different method of polymerization was used, a superior rubber was produced. To do this styrene is mixed with butadiene, emulsified in water along with the diolefin, and treated with a catalyst to produce a material called Buna S. If acrylo nitrile is used in place of styrene, a product called Perbunan is made. A newer process now being placed on a commercial basis by the Standard Oil Co. of New Jersey will produce a synthetic rubber, known as butyl rubber, by polymerizing a mixture of olefins and diolefins.

## Aviation Gasoline

Probably no other subject has received the study in the closing months of 1941 accorded the production of aviation gasoline of 100-octane number. The decision to supply, not only the rising needs of this country, but the needs of other countries as well, has created a demand beyond existing capacity. Hence, additional capacity must be built and a critical survey has been made of the potentialities of all refineries. Common practice is to produce high-octane materials including alkylate, isooctane, or neohexane, and then blend with isopentane, straightrun gasoline and tetraethyl lead.

The straightrun blending stock can be made only from those crudes which yield suitable fractions having octane numbers of 70 to 76. The procedure of making these stocks involves stripping the gasoline from the crude, removing the butane and lighter fractions and rerunning the debutanized stock. Where these selected crudes are not available, a low endpoint, straightrun gasoline is used, but the final blend requires a higher percentage of alkylate. The use of high-pressure hydrogenation permits making aviation gasoline blending stocks from some cuts of nonselected crudes. These blending stocks are also made by catalytic reforming.

Isooctane is produced by alkylation, coupling butanes with isobutane and using sulfuric acid as a catalyst. Other alkylation methods, selective polymerization and dehydrogenation and polymerization are methods used to produce isooctane. Neohexane, a newer high-octane blending stock, is produced by thermal alkylation. Isopentane is produced through fractional distillation of refinery or natural gasoline.

Of the various processes mentioned, sulfuric acid alkylation seems to be most widely considered at this time, particularly for those refineries not equipped with catalytic cracking. Generally, a substantial quantity of butylenes is produced as a result of thermal cracking and reforming. These are reacted with isobutane found in the various gases or brought in from natural-gasoline plants. The alkylate so produced is fractionated and then blended with isopentane and straightrun gasoline. The addition of tetraethyl lead brings the mixture up to the required 100-octane number.

A method that permits the small refiner to participate in the program is for him to produce polymer gasoline by catalytic polymerization. This would be shipped to a central location and put through an alkylation unit for the production of alkylate for blending into aviation fuel.

One means of increasing output is to use aviation-gasoline base produced from Houdry catalytic cracking units. It is reported that relatively high-octane number base stock can be made which meets requirements of the acid heat test, or substitute accelerated gum test. There is no shortage of straightrun gasoline but the substitution of the higher-octane-number material produced by the catalytic process permits reducing the percentage of isooctane required in most 100-octane-number blends. In this manner, the products of polymerization and alkylation are made to go farther.

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neoprene y sonprene. El tercer grupo empieza con diolefinas y modificadores, y produce Buna S (butadiene más estirene) y Perbuna o Buna N (butadiene más estirene acrilo). Otros cauchos, tales como el Hycar y el Chemigun, probablemente quedan comprendidos en esta clasificación. El último tipo empieza con olefinas más diolefinas y produce caucho de butilio. El Thiokol se clasifica como un caucho sintético pero no se comprende bien en el grupo. Es un producto de condensación de cloro, que contiene compuestos orgánicos y polisulfato de sodio.

El primer caucho sintético se hizo de isoprene obtenido de la turpentina. Más tarde se descubrió que el butadiene, que es el isoprane menos el grupo de etilio, y el butadiene de metilio, podían convertirse en caucho por calentamiento en presencia de sodio. El producto así formado se llamó Buna. Un producto bien conocido, el neoprene, se hace mediante la polimerización del cloroprene, el cual es isoprene con un átomo de cloro en la posición del grupo original de metilio.

Más tarde se descubrió un método mejor. Se vió que cuando se agregaban ciertos agentes de modificación al butadiene ye se usaba un método diferente de polimerización, se obtenía un caucho de superior calidad. Para hacer esto, el estirene se mezcla con el butadiene, emulsionado en agua conjuntamente con diolefina, y se trata con un agente catalítico, para producir un material llamado Buna S. Si se emplea nitrilio acrilo, en lugar del estirene, se produce un material llamado Perbunan. Un nuevo procedimiento, que se está organizando sobre una base comercial, por la Standard Oil Company of New Jersey, producirá un caucho sintético, llamado caucho de butilio, mediante la polimerización de una mezcla de olefinas y diolefinas.

## Gasolina de aviación

Probablemente ningún otro asunto ha recibido estos últimos meses de 1941 el estudio intenso que se ha dado a la producción de gasolina de aviación con número octano 100. La decisión de abastecer no sólo las crecientes necesidades nacionales, sino también la de otras naciones, ha creado una demanda en exceso a la capacidad existente. Por esta razón, deberá desarrollarse una adicional capacidad, y se ha hecho un estudio minucioso de las potencialidades de todas las refinerías. La práctica corriente es producir materiales de alto número octano, incluyendo alquilato, isoctano o neoctano, y luego mezclarlos con isopentano, gasolina de destilación y tetraetilio de plomo.

El material de mezcla de destilación puede hacerse sólo de aquellos crudos que producen adecuadas fracciones con números octano de 70 a 76. El procedimiento para hacer estos materiales comprenden la separación de la gasolina del crudo, la extracción del butano y fracciones más volátiles y la refinación del material desbutanizado. Donde no hay estos petróleos crudos selectos, se emplea entonces una gasolina de primera destilación, pero la mezcla final requiere un mayor procentaje de alquilato. El empleo de la hidrogenación a alta presión permite producir materiales de gasolina de aviación de ciertas fracciones de crudos ordinarios. Estos materiales de mezcla se hacen también por reformación catalítica.

El isoctano se produce por alcalización, uniendo butanos con isobutano y usando ácido sulfúrico como agente catalítico. Otros métodos de alcalización, polimerización selectiva y deshidrogenación y polimerización, se usan para producir isoctano. El neoctano, un nuevo material de mezcla de alto número octano, se produce por alcalización termal. El isopentano se produce por destilación fraccional de la gasolina de refinería o natural.

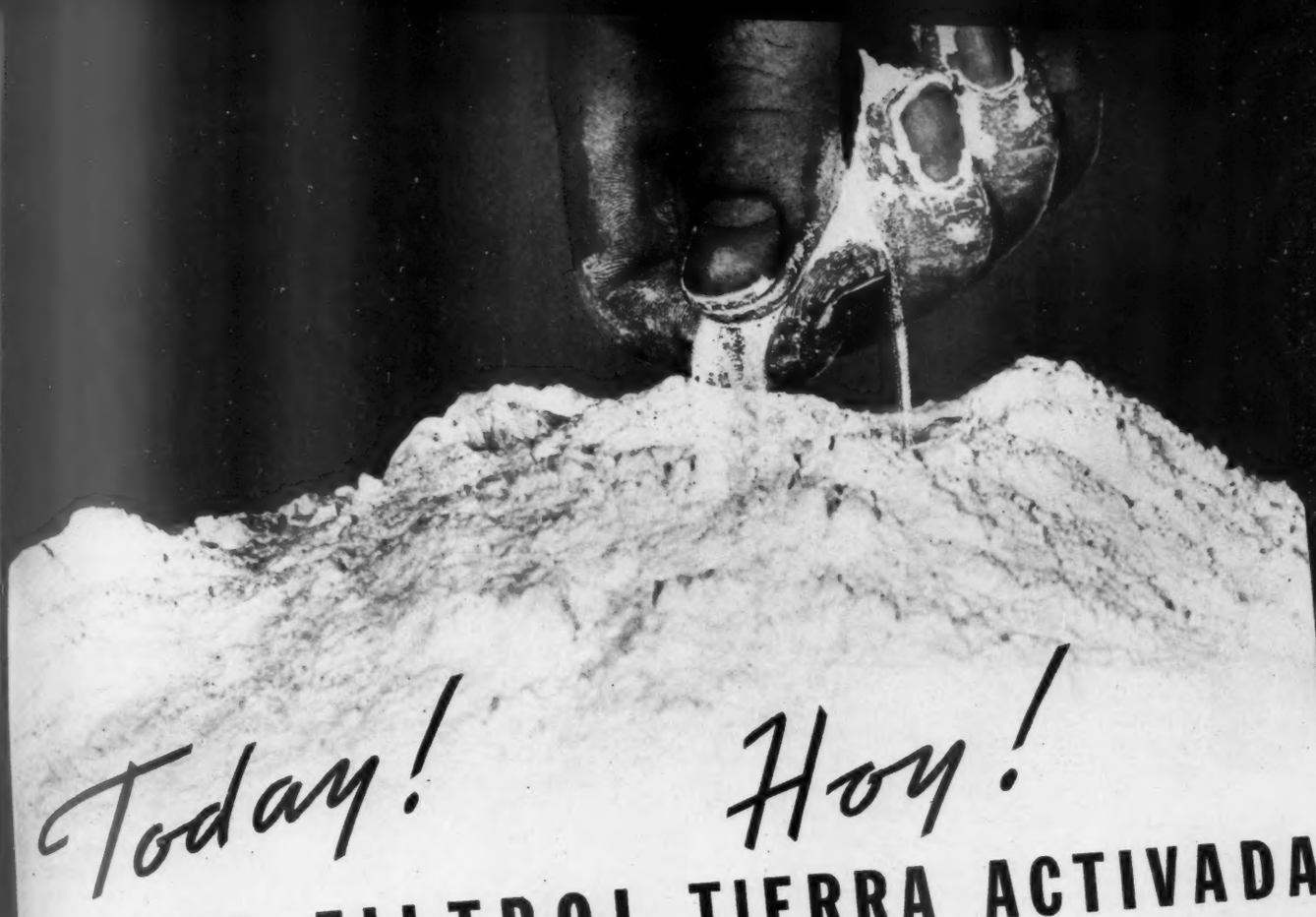
De los varios métodos mencionados, la alcalización por ácido sulfúrico parece ser objeto de particular consideración al presente, sobre todo, entre aquellas refinerías que no están equipadas para el procedimiento de cracking catalítico. Por lo general, se produce una buena cantidad de butilenos como resultado del cracking termal y reformación. Estos se reaccionan con el isobutano que se encuentra en los varios gases o que se trae de las instalaciones de gasolina natural. El alquilato así producido es fraccionado y luego mezclado con isopentano y gasolina de destilación. La adición de tetraetilio de plomo trae la mezcla al requerido número octano 100.

Un método que permite al refinador pequeño tomar participación en el programa es el de producir gasolina polimera por polimerización catalítica. Esta podría enviarse a un lugar central y someterse a un grupo de alcalización para la producción de alquilato para la mezcla con combustible de aviación.

Un medio de aumentar la producción es usar base de gasolina de aviación producida por los grupos de cracking catalítico de Houdry. Se dice que se puede hacer un material de base de alto número octano, que pasa el ensayo de calor o el de gomosidad. No hay escasez de gasolina de destilación, pero la substitución del material de mayor número octano producido por el procedimiento catalítico permite reducir el procentaje de isoctano requerido en casi todas las mezclas con número octano 100. De este modo, los productos de la polimerización y alcalización pueden aprovecharse mucho mejor.

Algunos cambios en el procedimiento han hecho posible, en ciertos casos, llegar al número octano 100 con tetraetilio de plomo, eliminando la necesidad de la mezcla con hidrocodimeros o alquilato. Parece que el cracking catalítico ha ensanchado, en grado considerable, la capacidad de producción para hacer combustible de aviación de alto número octano.

*(Continue en Pagina 237)*



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Some changes in the process have made it possible, in certain instances, to reach 100-octane number with tetraethyl lead, doing away with the necessity of blending hydrocodimers or alkylate. It would appear that catalytic cracking has expanded to a substantial degree the production capacity for making high-octane-number aviation fuel.

## Thermal Cracking

In the rush of new processes, thermal cracking is apt to be overlooked. However, it should be remembered that about half of the motor fuel produced is made by thermal cracking and such units have now grown to even greater importance. The gases produced by them represent the starting point in the manufacture of 100-octane-number aviation fuel.

The cracking unit is constantly being made to operate as a more flexible device. Multicoil selective units are being built to subject each cut to the proper cracking conditions. Units are designed to run to coke or residual liquid bottoms to meet the changing market requirements. The newer conceptions do not permit using residual stocks. Since complete separation of the heavier fractions cannot be effected in the topping unit, a modern version of an old process has been developed. This is known as "delayed coking," and represents a forward step over the older procedure of reducing crude residuum in batch stills to recover the gas oil as feed for cracking stills.

Delayed coking units operate at fairly low temperatures and pressures and in actual practice are frequently converted pressure stills. The operation provides for heating the oil rapidly and then allowing it to remain in a relatively large body for a long-enough time to fully accomplish the distillate separation. Crude bottoms from various sources are charged to a pipe still and then to a fractionator column, entering this column at about 650° F. The bottoms from the fractionator column, representing the bulk of the original charge, go to the coker furnace. Recycle oil is added to this furnace charge and the mixture is heated in the coil to about 880° F. outlet temperature. The discharge flows directly to the coke drums under about 50-lb. pressure. The overhead from the coke drums passes to the fractionator column.

After the coke bed is built up in a coking chamber, the stream is cut off and the coke dried out. The coke retains sufficient heat to cause it to practically free itself of oil within the time the drum stands preparatory to cleaning. Cleaning can be accomplished by any one of three methods commonly used. These include the use of cable, rotary-type drill, and water jet. Coke chambers are run alternately so that one can be cleaning while another is filling with coke.

The principal product coming from the fractionator is the distillate originating from the top of the coke drums while on stream. This distillate serves as charge stock for gas-oil-cracking units of either thermal or catalytic type. The gas produced from the system can be compressed and put through the high-pressure-still stabilizer or gas-recovery system.

Gas reversion involves the joint conversion of hydrocarbon gases and naphtha into gasoline approaching 80 A.S.T.M. octane number. When gas and naphtha are charged through the same coil, each has a beneficial effect on the other. Cracking velocities of individual propane and butanes are increased when admixed with naphtha, due to their partial consumption by alkylation and other molecular-structure changes or reactions. The gases have the effect of reducing coke formation in tubes which occurs with straight reforming. Admixed gases reduce the partial pressure and the critical temperature, thus lowering the dew point, which slows down tar condensation and deposition. As a result, the mixture can be run under more severe conditions with attendant octane-number improvement.

In the process, virgin and recycle liquefied gases are combined, preheated, and then passed through the gas-conversion portion of the coil where time-temperature conditions are varied in accordance with the composition of the stock. Pre-heated naphtha is injected into the gaseous stream and the mixture then passes through the remainder of the coil, where optimum conditions are maintained to effect further gas conversion of the naphtha. The stabilizer bottoms are separated into gasoline, quench oil and fuel oil by a rerun operation, and the recycle gas is recovered by absorption.

The process normally operates from 1,020° F. to 1,120° F. in the gas-conversion section; from 960° F. to 1,060° F. in the reversion section. Outlet pressures on the coil range from 1,500 to 2,000 lb. per sq. in. Yields of gasoline well above 100 per cent of the naphtha charge are obtained and clear octane numbers run above 70 A.S.T.M.

The naphtha-polyform process, likewise combines the gases and naphtha into a joint feed but introduces the naphtha at a different point in the unit. The polyform process utilizes the naphtha charge as an absorption oil to take the uncondensed C3 and C4 recycle from the residue gas leaving the stabilizer condenser. The liquefied C3 and C4 recycle stock from the stabilizer condenser is mixed with the rich naphtha in the base of the absorber. The rich naphtha, which combines the naphtha and gases, is preheated and then charged through the furnace. The material leaving the furnace is quenched with fractionator bottoms, flashed, and then fractionated and stabilized to end-point gasoline.

The process operates between 1,025° and 1,125° F. and at 1,000 to 2,000 lb. per sq. in. outlet pressure. The gasoline produced has a clear

## Cracking Termal

En el estudio de los nuevos procedimientos, no debemos perder de vista el cracking termal. Debemos, sin embargo, recordar que como la mitad del combustible de motor se hace por cracking termal, y que las instalaciones de esta clase presentan ahora más importancia que nunca. Los gases que ellas producen representan el punto de partida para la manufactura de combustible de aviación de número octano 100.

La instalación de cracking continúa haciéndose de modo que funcione como un grupo más flexible. Se están haciendo grupos de varios alambiques para someter cada fracción a correctas condiciones de cracking. Se han construido grupos para el aprovechamiento de coque o líquido residual de fondo, para responder a los variables requisitos del mercado. Como la completa separación de las fracciones más pesadas no puede efectuarse en el grupo de destilación, se ha desarrollado una versión moderna de un antiguo procedimiento. Esto se llama "coquificación retardada" y representa un progreso sobre el antiguo procedimiento de reducir el residuo del crudo en alambiques separados para recuperar el gas como alimentación para los alambiques de cracking.

Las instalaciones de coquificación retardada funcionan a temperaturas y presiones comparativamente bajas, y en la práctica, con alambiques de presión convertidos. El procedimiento comprende el calentamiento rápido del petróleo y a continuación se le deja permanecer en un cuerpo relativamente grande, por un tiempo suficiente para que se realize la separación del destilado. Los crudos de varias fuentes se cargan en un alambique tubular y pasan luego a la columna de un fraccionador, entrando en esta columna a como 650 grados F. Los materiales remanentes de la columna del fraccionador, que representan la mayor parte de la carga original, van al horno de coquificación. Petróleo de tratamiento se agrega a esta carga de horno y la mezcla se calienta en el alambique a una temperatura de salida de 880 grados F. La descarga sale directamente a los tambores de coque bajo una presión de como 50 libras. La parte superior del material en los tambores de coque, pasa a la columna del fraccionador.

Después de formada la capa de coque en la cámara de coquificación, se cierra la corriente y se deja secar el coque. El coque retiene suficiente calor para hacer que se desprenda de casi todo el petróleo dentro del tiempo que está en el tambor antes de ser limpiado. La limpieza puede hacerse por uno de los tres métodos generalmente seguidos. Estos incluyen el uso be cable, taladro de tipo rotativo y chorro de agua. Las cámaras de coquificación se manejan alternadamente, de modo que cuando se está limpiando una, la otra se está llenando de coque.

El producto principal que sale del fraccionador es el destilado que se origina de la parte de arriba de los tambores de coque mientras está pasando la corriente. Este destilado sirve de material de carga para las instalaciones de cracking de gas oil o petróleo gaseoso, de tipo termal o catalítico. El gas producido por el sistema puede comprimirse y pasarse por un estabilizador de alta presión o sistema de recuperación de gas.

La reversión de gas comprende la conversión mixta de gases de hidrocarburo y nafta en gasolina con número octano approximado de 80 según la A.S.T.M. Cuando se cargan el gas y la nafta por el mismo serpentín, la una tiene un efecto beneficio sobre la otra. Las velocidades cracking de propano y butanos individuales se aumentan cuando se mezclan con nafta, debido a su parcial consumo por alcalización y otros cambios y reacciones en la estructura molecular. Los gases tienen el efecto de reducir la formación de coque en los tubos, la cual ocurre con la reformación corriente. Los gases mexclados reducen la presión parcial y la temperatura crítica, aminorando así el punto de liquificación, lo cual retarda la condensación y deposición del alquitrán. Como resultado, la mezcla puede hacerse bajo condiciones más sevras, con un correspondiente aumento en número octano.

En el procedimiento, se mezclan gases vírgenes y tratados, en forma liquificada, luego se calientan previamente y se pasan después por la porción de conversión de gas del alambique, donde las condiciones de tiempo y temperatura se varían de acuerdo con la composición del material. Se inyecta nafta precalentada en la corriente gaseosa y la mezcla pasa entonces por el resto del alambique, donde se mantienen condiciones óptimas para efectuar adicional conversión de gas de la nafta. El material de fondo del estabilizador se separa en gasolina, petróleo de enfriar y petróleo combustible, por una operación de destilación, y el gas repasado se recupera por absorción.

El procedimiento se lleva a cabo normalmente a una temperatura de 1020 a 1120 grados F. en la sección de conversión de gas; a una de 960 a 1060 grados F. en la sección de reversión. Las presiones de salida del alambique varían de 1500 a 2000 libras por pulgada cuadrada. La producción de gasolina es supérior a 100 por ciento de la carga de nafta y se obtienen números octano de más de 70 según la A.S.T.M.

El procedimiento poliformico de la nafta combina también los gases y la nafta en una alimentación mixta, pero introduce la nafta en un punto diferente del grupo. Este procedimiento utiliza la carga de nafta como un material de absorción, para tomar el C3 y C4 sin condensar del gas residual que sale del condensador del estabilizador. El material C3 y C4 liquificado repasado del condensador del estabilizador se mezcla con la nafta en el fondo del absorbedor. La nafta fuerte, que combina la nafta y los gases, se calienta de antemano y se carga luego en el horno. El ma-

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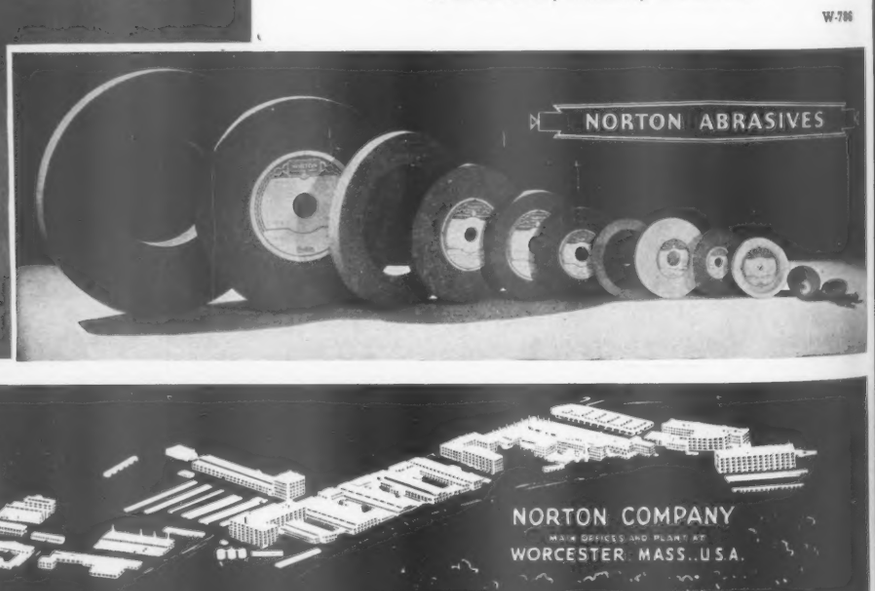

octane number running from 75 to 80 A.S.T.M.

## Catalytic Cracking

One of the most significant developments of the year was the announcement by the Standard Oil Co. of New Jersey of the "Fluid Catalyst" process and the start of construction of three units. This process employs fluid catalyst in a continuous catalytic cracking operation. Like the Houdry process, the Fluid Catalyst process is available to the petroleum industry under licensing arrangement.

The principal difference between this and other catalytic cracking processs is that the catalyst flows with the oil instead of being held in fixed catalyst cases. As a result, continuous cracking operations are maintained in one chamber and regeneration of catalyst in another. The continuous flow of catalyst and its regeneration elsewhere does away with the need for several catalyst chambers operating off and on. The effect of this arrangement is to reduce the installation cost. Gasoline produced from this operation has octane numbers of 78-82 A.S.T.M., or as high as 96 by the 1939 Research method. Gas oil or reduced crude is charged and yields of about 50 per cent gasoline made. The catalysts employed are readily available today.

An interesting development, in light of aviation-gasoline requirements has been made in the operation of Houdry cracking units. Generally speaking, fractions of cracked products cannot be used in blending 100-octane fuel since such gasoline will not pass the acid heat or accelerated gum test. This has necessitated the use of straightrun gasoline for blending which, because of its low octane number, forces the use of greater quantities of isooctane. However, the use of higher octane number, catalytically cracked gasoline permits the use of lesser quantities of alkylate, thus making available greater quantities of finished aviation fuel of 100 octane number.

It appears that the most significant change bringing about this result is the substitution of a synthetic catalyst for the natural catalyst formerly used. Aviation gasoline base has been produced from a natural catalyst tower by passing the aviation distillate back through the same unit a second time under somewhat milder operating conditions to polymerize unsaturated compounds and lower acid heat. The synthetic catalyst makes it possible to produce a satisfactory aviation fuel base by a once-through operation. The gasoline so produced has a higher octane and meets the existing acid-heat specifications without further treatment.

The hydroforming process has reached full-scale commercial development within the past year. The process is so named because it catalytically reforms low-octane naphtha or gasoline to high-octane gasoline. This is done at high temperatures and in the presence of hydrogen gas. The reactions involve dehydrogenating the hydrocarbon molecules, with part of the hydrogen so produced being recirculated with the fresh feed to control the extent and rate of the dehydrogenation reaction. The hydroforming catalyst causes ring closure to occur along with dehydrogenation so that the product contains a high percentage of aromatic hydrocarbons.

In operation, the fresh feed of low-octane-number naphtha is preheated by heat exchange and passes to a combination naphtha and recycle-gas preheater furnace. A separate hydrogen-rich recycle-gas stream from a gas separator is preheated by heat exchange and sent through another coil in the preheater furnace. The two streams from the furnace are then mixed and sent to the catalytic reactors which are under high pressure. The hot reaction products leaving the reactors pass through exchangers, then coolers, and are finally sent to a gas separator. Part of the gas from the separator is used as a recycle gas and the remainder is used as plant fuel. The liquid from the separator is pumped to a stabilizer column and then to a rerun tower where a heavy polymer is removed.

A small quantity of coke is deposited on the catalyst during the course of the hydroforming reaction. When the coke reaches a certain quantity, the catalyst reactor is removed from service and the coke is burned off. Burning is done by recirculating flue gases through the reactors, the rate of burning being controlled by adding small amounts of air to the flue gas. Reactivation is carried out at an elevated pressure and at carefully controlled temperatures. Operation of the reactivation system is entirely automatic and is controlled through a time-cycle mechanism. A yield of 80 per cent of 80 A.S.T.M. octane-number gasoline is recovered from a naphtha charge. Analysis of the final product shows that it contains from 40 to 50 per cent aromatics. By changing operating conditions, a product can be made to contain upwards of 80 per cent aromatics. This feature is of importance from a military standpoint, as it affords a means of increasing the production of toluene.

## Isomerization

Isomerization reactions involve changing the structure of a hydrocarbon molecule without changing its composition. This rearrangement, as in the case of branched chain hydrocarbons, is extremely valuable in fuels as they have higher antiknock values than the corresponding normal hydrocarbons. For example, a change from butane to isobutane is a highly desirable transformation as may be seen from the earlier discussion of synthesis. Isomerization followed by alkylation or polymerization is a convenient means to convert hydrocarbons of one form into others having a more desirable form.

One of the most widely accepted

*(Continue en Pagina 243)*

terial que sale del horno se trata con petróleos de fondo de fraccionador, se calienta, luego se fracciona y se estabiliza en forma de gasolina.

El procedimiento funciona a temperaturas de 1025 a 1125 grados F. y a presiones de salida de 1000 a 2000 libras por pulgada cuadrada. La gasolina producida tiene un número octano de 75 a 80 según la fórmula de la A.S.T.M.

## Cracking catalítico

Uno de los desarrollos más importantes del año fué el anuncio de la Standard Oil Company of New Jersey de su procedimiento "catalítico flúido" y el comienzo de la construcción de 3 instalaciones. Este procedimiento emplea un catalizador flúido, en un contínuo procedimiento de cracking catalítico. Como el procedimiento de Houdry, el de catalizador flúido está al alcance de la industria del petróleo mediante arreglo de permiso o licencia.

La diferencia principal entre el presente y otros procedimientos de cracking catalítico es que el catalizador corre con el petróleo, en lugar de mantenerse en cajas fijas. Como resultado, se efectúa una operación de cracking contínua en una cámara y la regeneración del catalizador se efectúa en otra. La corriente contínua de catalizador y su regeneración en otra parte elimina la necesidad de mantener varias cámaras de catalizador ocupadas y desocupadas. El efecto de este arreglo es reducir el costo de la instalación. La gasolina producida de esta operación tiene números octano de 78 a 82, según la fórmula de la A.S.T.M. o hasta 96 según el método Research. Se carga petróleo gaseoso o crudo reducido y se obtienen rendimientos de como 50% de gasolina. Los catalizadores empleados pueden obtenerse con facilidad al presente.

Un desarrollo interesante, en vista de los requisitos de gasolina de aviación, se ha realizado en la operación de las instalaciones de cracking según el procedimiento de Houdry. En términos generales, las fracciones de productos obtenidos por cracking no pueden usarse en la mezcla de combustible de número octano 100, a causa de que semejante gasolina no puede pasar la prueba de ácido o la de gomosidad. Esto ha necesitado el uso de gasolina destilada para la mezcla, la cual, debido a su bajo número octano, implica el uso forzoso de mayores cantidades de isoctano. Sin embargo, el uso de mayor número octano en gasolina obtenida cataliticamente, permite el uso de menores cantidades de alquilato, lo que a su turno produce mayores cantidades de combustible de aviación de número octano 100.

Parece que el cambio más importante que produce este resultado es la substitución de un catalizador sintético por el catalizador natural que se usaba anteriormente. La gasolina de aviación se ha producido de una torre de catalizador natural, repasando el destilado de aviación por la misma instalación una segunda vez bajo condiciones un tanto más suaves, para polimerizar los compuestos no saturados y reducir el calor ácido. El catalizador sintético hace posible producir un satisfactorio combustible de aviación mediante una sola pasada. La gasolina así producida tiene un mayor número octano y satisface los requisitos de ácido y calor sin exigir adicional tratamiento.

El procedimiento de hidroformación ha llegado a un completo desarrollo a base comercial dentro del año pasado. El procedimiento se llama así porque reforma cataliticamente la nafta o gasolina de bajo número octano en gasolina de alto número octano. Esto se hace a altas temperaturas y en presencia de gas de hidrógeno. Las reacciones comprenden deshidrogenación de las moléculas de hidrocarburo, con parte del hidrógeno así producido recirculado con alimentación fresca, para regular el régimen de la reacción deshidrogenante. El catalizador de hidroformación produce con la deshidrogenación cierto efecto que imparte al producto un subido porcentaje de hidrocarburos aromáticos.

En operación, la alimentación fresca de nafta de bajo número octano se precalienta por transferencia de calor y pasa a un horno de combinación de precalentamiento de nafta y gas repasado. Un chorro separado de gas repasado con gran cantidad de hidrógeno, proveniente de un separador de gas, se precalienta por transferencia de calor y se envía por otro alambique en el horno del precalentador. Los dos chorros o corrientes del horno se mezclan y se envian a los reactores catalíticos, los cuales están bajo alta presión. Los productos de la reacción caliente que salen de los reactores pasan por cambiadores luego por enfriadores y finalmente entran a un separador de gas. Parte del gas del separador se usa como gas de repaso y el resto se usa como combustible de instalación. El líquido del separador se inyecta por bomba a una columna de estabilización y luego a una torre de repaso donde se le quita el polimero pesado.

Una pequeña cantidad de coque se deposita en el catalizador durante el curso de la reacción de la hidroformación. Cuando el coque llega a cierta cantidad, se quita el reactor catalítico y el coque se quema. La quemadura se efectúa recirculando los gases por los reactores, y la rapidez de la acción se gobierna agregando pequeñas cantidades de aire al gas. La reactivación se efectúa a una presión elevada y temperaturas cuidadosamente reguladas. La operación del sistema de reactivación es completamente automático y se gobierna mediante un mecanismo de ciclo de tiempo. Se obtiene una gasolina de número octano 80, según la fórmula de la A.S.T.M., de una carga de nafta. El análisis del producto final muestra que contiene de 40 a 50 por ciento de aromáticos. Cambiando las condiciones de operación, puede ha-

*(Continued on Page 243)*

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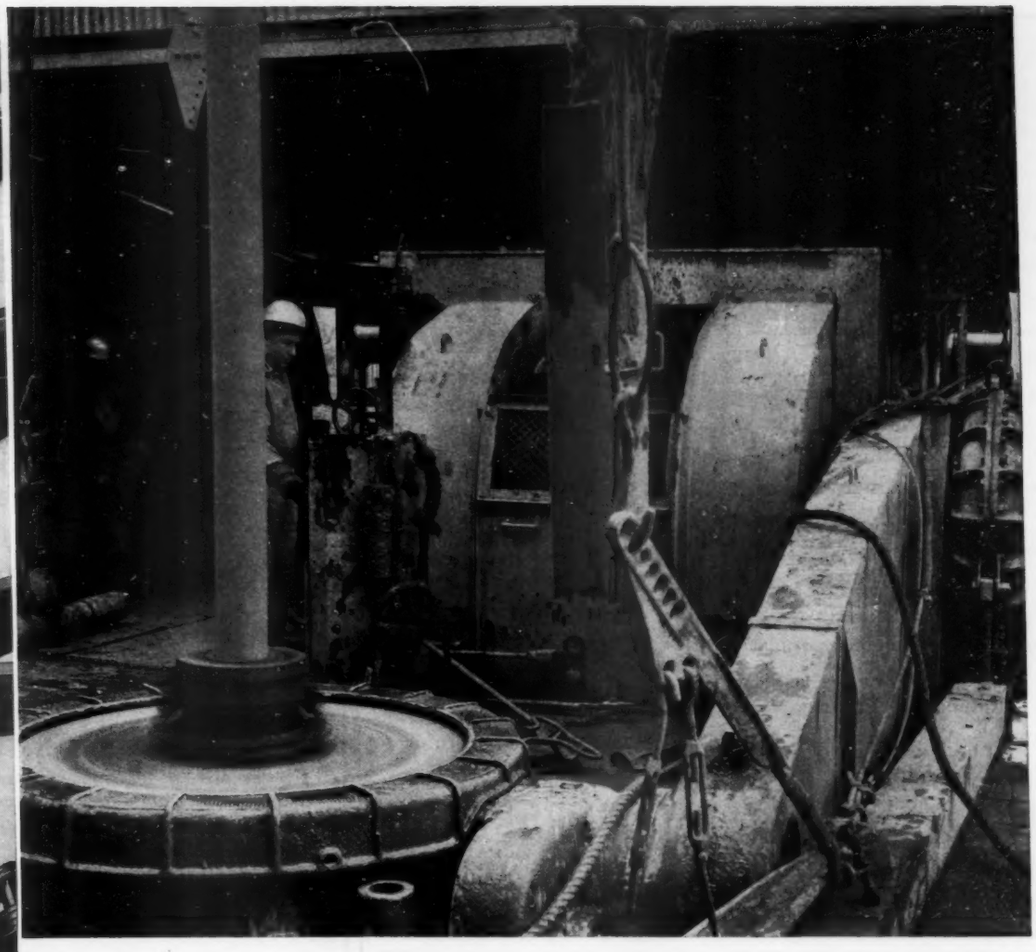

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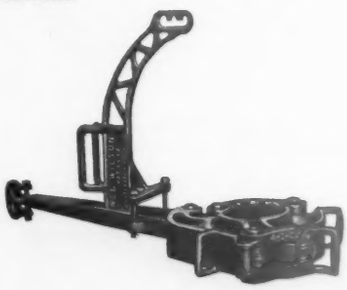

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methods for producing high-octane material is the catalytic sulfuric acid alkylation process. Alkylation brings about a direct combination of butylenes and isobutane to produce saturated isoparaffins, which represent an important source of 100-octane-number aviation fuel. Most refineries produce substantial quantities of butylenes but a much lesser quantity of isobutane which is needed in about an equal proportion for alkylation. In the past, considerable quantities of isobutane have been furnished by extraction at natural-gasoline plants, but this source is, of course, limited.

The most commonly produced light hydrocarbon at the refinery is butane and the answer to the isobutane shortage is found in its conversion from butane by isomerization. This process takes on new importance in view of the rapidly expanding requirement for aviation fuel.

The first commercial isomerization plant was built and placed on stream at the Standard-Vacuum refinery in Sumatra, Netherlands East Indies. Other plants have now reached the production stage.

One process, known as the Shell Isomerization Process, has been publicly offered to the industry under licensing agreement. The essential features of the unit are fairly simple. The charge stock consists of relatively pure normal butane. Olefins and pentanes shorten the catalyst life. However, propane and isobutane are harmless. The butane charge is pumped through dryers to free it completely of water.

The stock is mixed with a small quantity of anhydrous hydrogen chloride, vaporized, and passed through the catalyst vessels, where isomerization takes place. The presence of the hydrogen chloride gas in the system has a beneficial effect on the life of the catalyst. The catalyst consists of aluminum chloride distributed on a porous support of solid inorganic material which has been partly dehydrated. The supporting material may be bauxite, kaolinite, silica or aluminum oxide. The reaction being exothermic, little outside heat is provided.

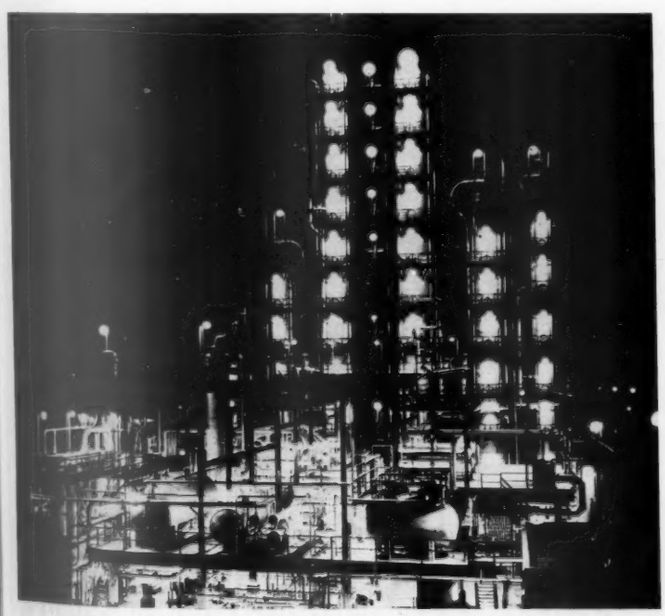
Vapors from the catalyst vessels pass to a water cooler and then to a cooled condenser where total condensation is effected, and the liquid is collected in a receiver. The liquid then goes to a stripper for removal of hydrogen chloride, which is recycled. The mixture of butane and isobutane is withdrawn as bottoms and sent to the fractionation section of the alkylation unit where the butane is separated and sent back for recharging to the isomerization unit. The yield per pass is 45 per cent. Some small quantities of side reaction materials are formed which are vented from the system. Venting is done from the vapor space in the accumulator.

Here ordinary carbon steels are suitable as construction material since temperatures and pressures are moderate. However, hydrogen chloride, upon contact with air, attracts the moisture of the air and is converted to a dilute hydrochloric acid which is very corrosive. Special precautions must be taken to forestall such action.

## Combination Units

The combination unit, involving crude topping and thermal cracking, has been somewhat overshadowed by the newer synthetic processes. However, this type of unit plays a substantial role in crude-oil processing and will probably continue to do so.

An interesting plant has been recently built by the Continental Oil Co. near Lake Charles, La. It is a combination plant rather than the customary combination unit plus auxiliaries, and is a model of compactness and correlated flow.



*Night view of Gulf Oil Corp. new aviation-gasoline plant at Port Arthur, Tex.*

*Vista nocturna de la nueva refinería de gasolina de aviación de la Gulf Oil Corp., en Port Arthur, Texas.*

cerse un producto que contenga hasta 80 por ciento de aromáticos. Este rasgo es de importancia desde el punto de vista militar, pues presenta un medio de aumentar la producción de tolueno.

## Isomerización

Las reacciones de isomerización comprenden el cambio de estructura de una molécula de hidrocarburo, sin alterar su composición. Este arreglo, como en el caso de los hidrocarburos en cadenas seguidas, es extremadamente valioso en combustibles, pues estas últimas tienen un mayor valor antidetonante que los hidrocarburos normales correspondientes. Por ejemplo, un cambio de butano a isobutano es una transformación muy importante, como podrá verse en la discusión de la síntesis, que hemos anotado ya. La isomerización, seguida por alcalización o polimerización, es un medio muy conveniente para convertir hidrocarburos de una forma en otros con formas más convenientes.

Uno de los métodos más aceptados para la producción de material con elevado número octano es el procedimiento de alcalización catalítica con ácido sulfúrico. La alcalización produce una combinación directa de butilenos e isobutano, para hacer isoparafinas saturadas, lo cual representa una fuente importante de combustible de aviación de número octano 100. Casi todas las refinerías producen buenas cantidades de butilenos, pero cantidades mucho menores de isobutano, de las cuales se necesitan en iguales proporciones para la alcalización. En el pasado, se han obtenido considerables cantidades de isobutano por extracción en las instalaciones de gasolina natural, pero esta fuente, es por supuesto, limitada.

El hidrocarburo liviano más comunmente producido en la refinería es el butano, y la respuesta a la escacez de isobutano se encuentra en su conversión de butano por isomerización. Este procedimiento adquiere nueva importancia en vista de la creciente demanda de combustible de aviación.

La primera instalación de isomerización comercial fué construida y colocada en operación en la refinería de la Standard-Vacuum en Sumatra, India Holandesa. Otras instalaciones han llegado ya a etapa de producción.

Un procedimiento, llamado procedimiento de isomerización Shell, ha sido ofrecido públicamente a la industria, bajo arreglo de permiso o licencia. Los rasgos esenciales de la instalación son bastante sencillos. El material de carga consiste en butano normal relativamente puro. Las olefinas y pentanos acortan la duración del catalizador. Sin embargo, el propano y el isobutano son inofensivos. La carga de butano se inyecta por bomba a traves de secadores para librarla completamente de agua.

El material se mezcla con una pequeña cantidad de cloruro de hidrógeno anhídrico, vaporizado, y se pasa por los receptáculos del catalizador, donde se lleva a cabo la isomerización. La presencia del gas de cloruro de hidrógeno en el sistema tiene un efecto beneficioso sobre la duración del catalizador. El catalizador consiste en cloruro de aluminio distribuido en un soporte poroso de material inorgánico macizo, que ha sido parcialmente deshidratado. El material soportante puede ser bauxite, kaolinite, silicio u óxido de aluminio. Como la reacción es exotérmica, se requiere muy poco calor de afuera.

Los vapores de los receptáculos o cámaras del catalizador pasan a un enfriador de agua y luego a un condensador enfriado donde se efectúa la condensación total, colectándose el líquido en un recipiente. El líquido va luego a otra unidad donde se le quita el cloruro de hidrógeno, el cual se repasa. La mezcla de butano e isobutano se quita como material de fondo y se envía a la sección de fraccionación de la instalación de alcalización, donde se separa el butano y se devuelve para servir de carga en la instalación de isomerización. El rendimiento por pasada es 45 por ciento. Cierta pequeña cantidad de materiales de reacción secundaria formada se quita por ventilación del sistema. La ventilación se efectúa por el espacio de vapor en el acumulador.

Las aleaciones ordinarias de acero al carbono se adaptan aquí como material de construcción, a causa de que son moderadas las temperaturas y las presiones. Sin embargo, el cloruro de hidrógeno, al tener contacto con el aire, atrae la humedad del aire y se convierte en un ácido hidroclórico diluido muy corrosivo. Deben tomarse precauciones especiales para protegerse contra semejante acción.

## Instalaciones de combinación

La instalación de combinación, que comprende la destilación primaria y el cracking termal, ha sido un tanto eclipsada por el mas reciente procedimiento sintético. Sin embargo, este tipo de instalación desempeña un papel muy importante en el tratamiento del petróleo crudo y probablemente continuará haciéndolo.

Una instalación sumamente interesante ha sido recientemente construida por la Continental Oil Co., cerca de Lake Charles, Luisiana. Es una instalación de combinación, más bien que la corriente combinación más grupos anexos o auxiliares, y representa un modelo de organización simplificada y trabajo coordinado.

El procedimiento combina la destilación primaria, el cracking termal, la polimerización, la alcalización y la reversión del gas. El rendimiento total de la operación es 65% de combustible de motor de número octano elevado. El rendimiento incluye componentes de combustible de aviación de número octano 100, rechos en la sección de alcalización. Es una parte del programa de estabilizar el petróleo crudo en el mismo campo y de enviar el crudo y el de primera destilación separadamente a la refi-

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● *Left:* Pole trailer

● *Below:* Semi trailer

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● *Above:* 4 wheel trailer

● *Above:* Pole trailer

● *Left:* Semi trailer

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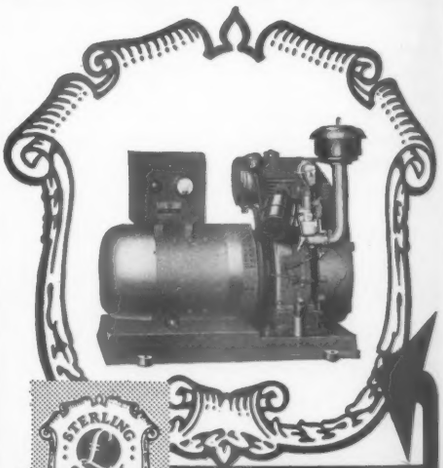

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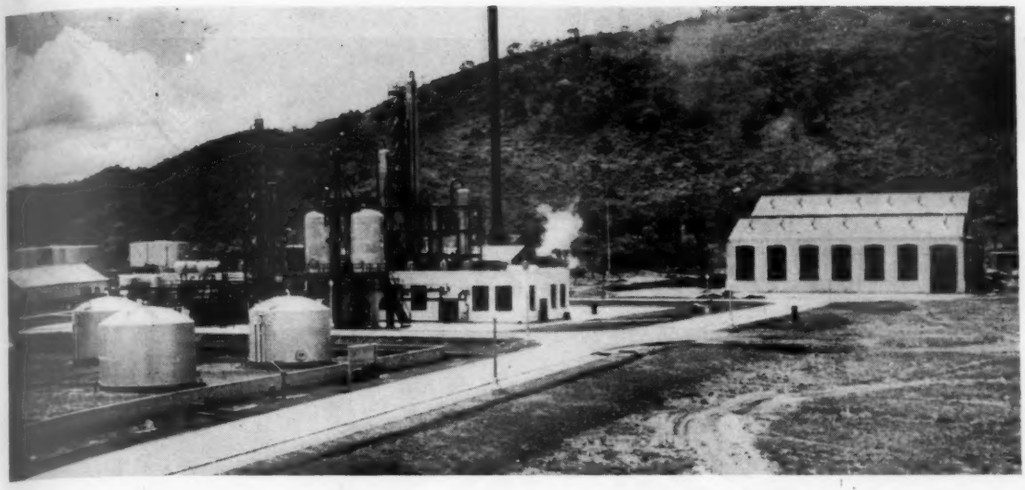


*This combination topping and cracking unit built by Y. P. F. near Salta in Argentina has been enlarged three times.*

*Esta instalación de combinación de distilación primaria y cracking construida por Y.P.F. cerca de Salta, Argentina, ha sido agrandada tres veces.*

The processing combines crude topping, thermal cracking, polymerization, alkylation, and gas reversion. The over-all yield from the operation is 65 per cent high-octane-number motor fuel. The yield includes some 100-octane-number aviation fuel components made from the alkylation section. It is a part of a program of stabilizing the crude in the field and shipping the crude and casing head separately to the refinery to be processed.

## Auxiliary Pumping

Major progress continues to be made in the design and development of many varieties of auxiliary equipment, including special heaters, towers, pumps, valves, insulation, refractories and instruments. Too much credit cannot be given to the ingeniousness that has been displayed in the improvement of these.

Despite the use of solvent-extraction processes for lubricating-oil stocks, adequate separation of the original fractions by distillation seemingly has its place. A recent installation was made of a 7,000-bbl. vacuum fractionating still to separate Mid-Continent topped crude into gas oil, neutral stock, and a short residue.

The charge, at about 600° F., is pumped through the radiant section of the heater in eight parallel streams to avoid high pressure and temperature in the coil, and is flashed in the main fractionating column with steam which is superheated in the convection section of the same heater. Side streams of neutrals are withdrawn from the column for stripping with reboiler heat and superheated steam in a three-section stripping column. The bottom cut passes to its stripper which is the lower section of the original vacuum-tower installation. A 48-in. vapor line runs from the main fractionator to the main barometric-condenser section.

Data have been published showing the reduction in evaporation losses that can be made through painting gasoline tanks white. This is of particular interest in view of the apparent shortage of aluminum and the probability that aluminum paint is difficult to obtain. As a matter of fact, some tests indicate lower vapor-space temperatures where roofs are painted white as compared with aluminum.

The difficulty with white paint has been its lack of durability. A great deal of research work has been done by the various paint companies to develop self-cleaning white paints that will retain most of their brightness after weathering.

Vermiculite, a reasonably new insulating material, is finding increasing application in the refining industry. The natural mineral is processed by dropping it through a furnace held at a temperature of 2,000° F. Here the material expands to 15 times its volume. The product is used in granular form as an insulator, or it is cast into bricks or other forms, using a small quantity of binder. It is reported that in any form it is fireproof, rotproof, and does not react with other substances.

## Chemical Treatment

A new treating process has been developed by the Atlantic Refining Co. for removing mercaptans from gasoline and improving lead susceptibility. The mercaptan removal is brought about by extraction with an aqueous solution of caustic soda and methanol. The caustic is continuously regenerated and the methanol almost entirely recovered.

In operation of the process, a hydrogen sulfide-free gasoline is charged into the base of a tall countercurrent column packed with Raschig rings. The methanol is introduced near the middle of the column. A concentrated aqueous solution of caustic soda is fed in near the top of the tower. The gasoline passes upward and out the top, while the caustic-methanol solution is drawn from the base of the extraction column and passed to a stripping column. From the stripper, which

*(Continued on Page 249)*

de espacio de vapor donde los techos se pintan de blanco, en comparación con los pintados de aluminio.

La dificultad que presenta la pintura blanca es su falta de duración. Se ha hecho mucho estudio por parte de numerosas fábricas de pintura, para desarrollar pinturas blancas de limpieza automática, que retengan la mayor parte de su brillantez después de expuestas a la intemperie.

El Vermiculite, un material de aislamiento relativamente nuevo, está encontrando creciente aplicación en la industria de la refinería. El mineral natural se trata en un horno cuya temperatura se mantiene a 2000 grados F. Aquí se dilata el material a 15 veces su volumen. El producto se usa en forma granular, como aislador, o se funde en ladrillos u otras formas convenientes, empleándose una pequeña cantidad de ligazón. Se dice que en cualquiera forma, es a prueba de fuego, a prueba de descomposición y no reacciona con otras substancias.

## Tratamiento quimico

Un nuevo método de tratamiento ha sido desarrollado por la Atlantic Refining Co. para quitar de la gasolina los mercaptanos y mejorar su susceptibilidad al plomo. La extracción del mercaptano se realiza con la ayuda de una solución acuosa de soda cáustica y metanol. La soda cáustica es regenerada continuamente y el metanol se recupera casi por completo.

En la operación del procedimiento, una gasolina exenta de súlfuro de hidrógeno se carga en la base de una alta columna de contracorriente empacada con anillos Raschig. El metanol es introducido cerca de la mitad de la columna. Una solución acuosa concentrada de soda cáustica se introduce cerca de la parte superior de la torre. La gasolina pasa por arriba, mientras que la solución cáustica de metanol es aspirada de la base de la columna de extracción y pasada a una columna de rectificación. Del rectificador, que está provisto de una caldera interior, el metanol y agua pasan por arriba y caen en un separador acumulándose aquí en dos capas. La capa superior es de mercaptano y la inferior de alcohol acuoso, regulándose la relación de agua a alcohol, para conservarla al punto de maxima conveniencia para disolver el mercaptano. La soda cáustica es regenerada en la columna del rectificador y devuelta a la columna de extracción. El metanol y agua pasan del separador a una pequeña columna de fraccionación, donde el alcohol sale por arriba y regresa a la columna de extracción mientras que el agua de la base de la columna de fraccionación regresa a la sección de rectificación. La ventaja principal de este procedimiento está en purificar la gasolina tratada y al mismo tiempo, mejorar el número octano básico y la susceptibilidad al plomo. La respuesta inhibidora de la gasolina tratada de esta manera es excelente.

El procedimiento Shell ha sido

*(Continue en Pagina 249)*

nería para hacer acquí la refinación final.

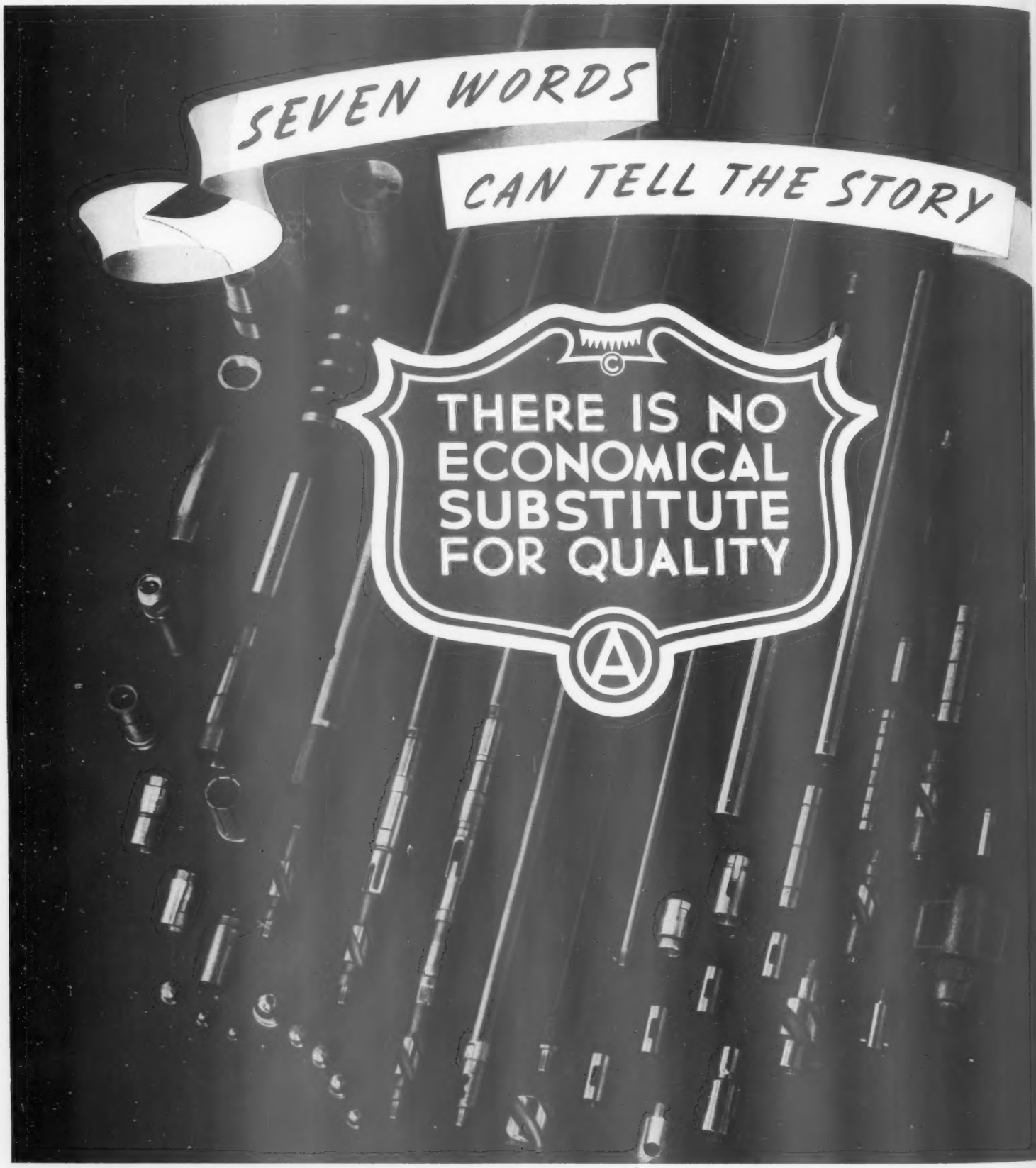
## Equipo auxiliar

El progreso principal se manifiesta en el tipo y desarrollo de una gran variedad de equipo auxiliar, incluyendo calentadores especiales, torres, bombas, válvulas, aislamiento, materiales refractarios e instrumentos. No se puede dar demasiado crédito al genio inventivo que se ha desplegado en el perfeccionamiento de estos equipos auxiliares.

A pesar del uso de procedimientos de extracción por solventes para los aceites lubricantes, la separación adecuada de las fracciones originales, por destilación, tiene todavía su puesto en el programa de trabajo. Recientemente se hizo una instalación de un alambique de fraccionación al vacío de 7.000 barriles de capacidad, para separar el crudo destilado Mid-Continent en gas oil, material neutro y cierto residuo.

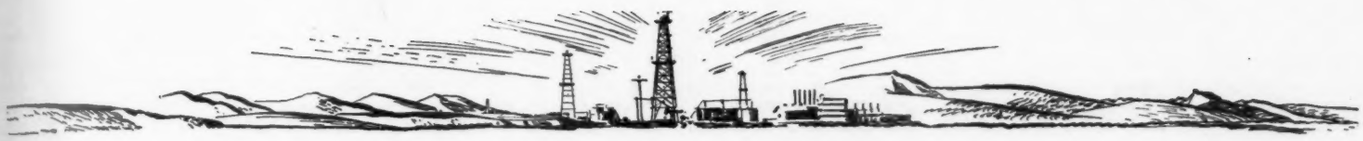
La carga, a más o menos 600 grados F. se inyecta por bomba por la sección radiante del calentador, en 8 chorros paralelos, para evitar las altas presiones y temperaturas en el serpentín, y es luego tratado en la columna principal de fraccionación, con vapor, el cual es recalentado en la sección de conección del mismo calentador. Los chorros laterales de neutrales se quitan de la columna para su rectificación con calor de caldera auxiliar y vapor recalentado en una columna rectificadora de 3 secciones. El residuo pasa a su rectificador, el cual es la sección inferior de la instalación original de torre al vacío. Una tubería de vapor de 48 pulgadas sale del fraccionador principal a la sección principal del condensador barométrico.

Se han publicado datos que muestran la reducción en pérdidas por evaporación que pueden lograrse pintando de blanco los tanques de gasolina. Esto es de particular interes en vista de la aparente carestía de aluminio y la probabilidad de que hará muy difícil obtener pintura de aluminio. En efecto, ciertos ensayos hechos indican menores temperaturas




**Here are a few parts of Axelson Pumps. There are thousands of others. Precision turned and ground to extremely close tolerances, all Axelson Pump parts are designed and built for a long trouble-free service life. Even in wells with bad conditions—salts, sands, sulphides, emulsions, gas, water, unusual depths — Axelson Pumps are dependable because Axelson has studied these conditions and built special pumps to overcome them successfully.**

**Mostramos aquí unas pocas piezas de bombas Axelson. Hay millares de otras. Labradas a máquina con suma precisión y pulidas, con tolerancias mínimas, todas las piezas de bombas Axelson están proyectadas y construidas para dar un servicio muy largo y exento de irregularidades. Hasta en pozos en malas condiciones—con sal, arenas, sulfatos, emulsiones, gas, profundidades extraordinarias—las bombas Axelson son seguras, debido a que los ingenieros de la Axelson han estudiado estas condiciones y construido bombas especiales para resolver los problemas.**



## THE MIRACLE OF INTERCHANGEABLE PARTS

With the few letters in the alphabet you can spell all the words in the language—hundreds of thousands—if necessary.

With far more interchangeable parts than there are letters in any modern alphabet, the range of Axelson Pump combinations that are possible exceed immensely the most exacting specifications for meeting the conditions in any well in the world.

The very fact of interchangeability in both factory and field is proof of the quality and accuracy of Axelson Pump Parts. The further fact of the highly efficient and profitable performance of individual parts and combinations is a tribute not only to the parts themselves but also to the physical equipment of the plant and the organization and the policies of the management from which the parts originate.

In fifty years of manufacturing—mostly for the oil industry—the Axelson objective has always been to make products that would save and make money for the users. The growth of the Company by steady expansion to international scope makes it certain that this objective has been reached. From the beam to the bottom of the well you are safe with Axelson Sucker Rods and Pumps.

## EL MILAGRO DE LAS PIEZAS INTERCAMBIABLES

Con las pocas letras del alfabeto se pueden formar todas las palabras en un idioma—millares de palabras.

Con más piezas intercambiables que letras en un alfabeto moderno, la escala de combinaciones de las bombas Axelson que son posibles, sobrepasan enormemente las especificaciones más exigentes para satisfacer las condiciones de cualquier pozo del mundo.

El hecho solo de su intercambio tanto en la fábrica como en el mismo trabajo es evidencia de la calidad y exactitud de las piezas de bombas Axelson. El hecho adicional del funcionamiento tan satisfactorio y lucrativo de las piezas individuales y de sus combinaciones, es un tributo no sólo a las piezas mismas, sino también al equipo físico de la fábrica y de la organización, lo mismo que a los métodos de la administración en que estas piezas de originan.

En cincuenta años de manufactura—en su mayor parte en la industria del petróleo—el objetivo de la Axelson ha sido siempre fabricar productos que puedan ahorrar y ganar dinero para sus dueños. El progreso nacional de la compañía y su creciente negocio en los mercados internationales, constituyen evidencia de que ha alcanzado su objetivo. De la boca al fondo del pozo, Vd. está seguro con las varillas de bomba y bombas Axelson.

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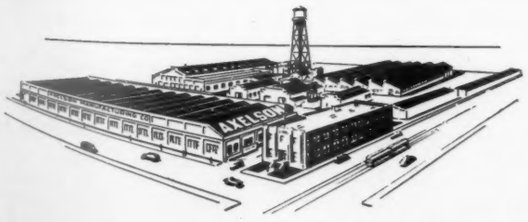


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DEEP WELL PLUNGER PUMPS & SUCKER RODS

**AXELSON** VENDE Y *REPARA*
bombas y varillas de bomba de pozos profundos

# *Para la defensa del hemisferio—*
# *For hemisphere defense—*

Más gasolina para aviones de combate es lo que se necesita al presente para la defensa del hemisferio occidental.

Por exigirlo así el Gobierno, las refinerias de los Estados Unidos han aumentado ya 4 veces su capacidad de producción de gasolina de 100 octanos, no habiéndose alcanzado todavía el fin deseado.

Todas las refinerías que la fabrican contribuyen así a la protección de su país y del hemisferio occidental.

Pueden conseguirse, por medio de la Universal, procedimientos que han sido ya probados para la fabricación de gasolina de 100 octanos, así como también el famoso procedimiento Dubbs para el cracking del petroleo, el cual se emplea para manufacturar la mayor cantidad posible de gasolina que no produce golpeos en el motor de cualquiera clase de petroleo crudo o fracción.

Los inhibidores de la U. O. P. mantienen la goma fuera de la gasolina para aviones o de cualquiera otra clase, mientras que el procedimiento Unisol para tratar, autorizado y dirigido por la Universal, hace el que la gasolina no produzca golpeos y aumenta la susceptibilidad de ésta al plomo—al costo más bajo que pueda darse.

Y aquellas personas a quienes se les da la autorización respectiva cuentan con la ayuda amistosa y eficaz de los especialistas de la Universal en materia de refinación.

Nos será grato suministrar informes completos a quienes los soliciten.

More fighting grade aviation gasoline is the need of the hour as the western hemisphere prepares for defense

At the call of the government, United States refiners are already increasing 4-fold their capacity to produce 100-octane gasoline and the end is not in sight

Every refiner who makes it contributes to the security of his nation and the western hemisphere

Tried and proven processes for making 100-octane gasoline are available to all refiners through Universal, as well as the world-famous Dubbs-cracking process to make highest yields of anti-knock motor gasoline from any kind of crude or any fraction of it

U.O.P. inhibitors keep all the gum out of aviation gasoline or any other kind, while the Unisol treating process, licensed and engineered by Universal, preserves the anti-knock value and increases the lead susceptibility of gasoline — at lowest cost

And the friendly and effective help of Universal's refining specialists is always at the service of all licensees

We invite you to write for full information

Universal Oil Products Co
Chicago, Illinois

Dubbs Cracking Process
Owner and Licensor

INSTITUTO DE TECNOLOGIA DE PETROLEO DE REFINADORES
THE REFINERS INSTITUTE OF PETROLEUM TECHNOLOGY

is fitted with an internal reboiler. methanol and water pass overhead to collect in a separator in two layers, the upper one mercaptan and the lower water-alcohol, the ratio of water to alcohol being regulated to keep it at the point of minimum solubility of mercaptan. The caustic is regenerated in the stripping column and returned to the extraction column. The methanol water passes from the separator to a small fractionating column where the alcohol is taken off overhead and is returned to the extraction column, while the water from the base of the fractionating column returns to the stripping section. The principal advantage in the process lies in sweetening the gasoline treated and, at the same time, improving base octane number and lead susceptibility. Inhibitor response of gasoline treated in this manner is excellent.

The Shell solutizer process has been put into commercial operation in treating gasoline for sweetening and for the removal of mercaptan and total sulfur. The base octane number of the sweet gasoline is improved and the lead susceptibility is also bettered.

The potassium salt of isobutyric acid dissolved in potassium hydroxide solution has been found to be the best solutizer. A treating unit consists of two sections, an extraction section and a regenerating section. Gasoline direct from plant stabilizers is pumped through a preheater where traces of hydrogen sulfide are removed by dilute caustic soda. The gasoline is then cooled to 85° F. and passed to the extraction tower. Moisture precipitated in the cooler and traces of caustic solution carrying over from the preheater are removed by a coalescer filled with steel wool.

Gasoline passes up through the tower against a descending stream of solutizer solution. After leaving the top of the tower, it goes through another coalescer for removal of a small amount of solutizer carryover. The solution from the bottom of the tower is denuded of small amounts of suspended gasoline and then passed through the regenerating column. In this column, heat and steam are supplied for removal of the mercaptans which are subsequently burned. The stripped solution is cooled and returned to the extraction column.

The Perco catalytic desulfurization process employs catalytic means to decompose the organic sulfur compounds to hydrogen sulfide thus carrying sulfur removal to a high degree.

Catalytic-desulfurization catalysts readily decompose mercaptans, alkyl sulfides, aromatic sulfides and disulfides. Thiophanes and carbon disulfide are more difficult to decompose while thiophenes are not removed. However, the latter is least objectionable with respect to effect on tetraethyl lead response.

In operation, the feed stock is vaporized in a tubular heater and superheated to about 750° F. The vapors pass downward through a catalyst tower where the organic sulfur is decomposed to hydrogen sulfide and the corresponding hydrocarbon. The removal of hydrogen sulfide from the desulfurized product is effected by straight caustic washing or water washing or a combination of the two. Regeneration of the catalyst is carried out by burning in place in an atmosphere of controlled oxygen or it can be done in an outside clay burner. It is reported that catalyst masses have been regenerated 15 to 20 times without appreciable loss in efficiency.

The advantage in treating cracked or other semifinished gasolines is in increased base octane numbers and in higher lead response. Gains of several octane numbers are claimed. There is also a possible field for the process in desulfurizing poly-feed stocks to promote the efficiency of the polymerization process.

The Gray hot-clay process is another one of importance now. The gasoline is vaporized and passed through a bed of ordinary clay at a temperature of 700° F. Sulfur is removed and the octane number and lead susceptibility of the gasoline improved considerably.

Another recent installation of interest is an Edeleanu sulfur dioxide-extraction plant for the preparation of high-solvency naphthas and odorless cleaning solvents from Mid-Continent crude oils. An odorless insecticide base is also produced.

Lecithin, obtained from soy beans, has come into recent prominence as a gasoline additive. It is a modified glyceride containing phosphorous and nitrogen. Minute quantities of this material stabilizes the gasoline against haze and reduces corrosion. This last feature is particularly applicable to aviation gasoline stored in steel drums.

## Lubricants

There have been few new developments in the processing of lubricating oils in the past year. The trend is still toward the production of oils of initially higher resistance to oxidation and solvent extraction is the means usually employed. Single solvent processes are widely used on light stocks and the double solvent type or single solvent plus propane deasphaltizing used on heavy stocks. Of course, there is no clear line to be drawn between the limits of the various processes.

The greatest emphasis in the lubricating-oil field recently has been on addition agents for improving service results. These agents are designed to add resistance to oxidation, detergency, and corrosion resistance to motor oils. Among the many types of materials available are sulfurized natural and synthetic esters, sulfurized aliphatic olefins, organic phosphites and phosphates, chlorinated and metallic soaps.

The conventional method of removing oil from crude wax is to sweat it. This practice is an old one and widely followed. One new idea

puesto en operación comercial en el tratamiento de la gasolina para su purificación y para la extracción del mercaptano y azufre total. El número octano básico de la gasolina purificada se mejora mucho y también se mejora su susceptibilidad al plomo.

La sal de potasio de ácido isobutírico disuelta en solución de hidróxido de potasio ha dado los mejores resultados como solución. La instalación de tratamiento consta de dos secciones, una de extracción y otra de regeneración. La gasolina proveniente directamente de los estabilizadores se inyecta a través de un precalentador, donde las trazas o vestigios de sulfuro de hidrógeno se quitan por soda cáustica diluida. La gasolina se enfría entonces a 85 grados F. y se pasa a la torre de extracción. La humedad precipitada en el enfriador y los vestigios de solución cáustica salidos del pretratador, se quitan por un coalescedor relleno de algodón de acero.

La gasolina pasa por la torre contra una corriente descendiente de solución. Después de dejar la parte superior de la torre, pasa por otro coalescedor, para desprenderse de una pequeña cantidad de solución remanente. La solución del fondo de la torre es despojada de pequeñas cantidades de gasolina en suspensión y luego pasada por la columna de regeneración. En esta columna, el calor y el vapor se suministran para quitar los mercaptanos, los cuales son quemados a continuación. La solución rectificada es enfriada y devuelta a la columna de extracción.

El procedimiento de desulfuración catalítica de Perco emplea un medio catalizador para descomponer los compuestos orgánicos de azufre en súlfuro de hidrógeno, efectuándose así la remoción del azufre de una manera máxima.

Los catalizadores empleados en este procedimiento de desulfuración descomponen facilmente los mercaptanos, súlfurós alcalinos, sulfatos aromáticos y disulfatos. Los tiofanos y disulfato de carbono son más difíciles de descomponer. Los tiofanos no se quitan. Sin embargo, estos últimos son los menjos inconvenientes con relación al efecto que tienen sobre la respuesta al tetraetilio de plomo.

En operación, el material de alimentación es evaporado en un calentador tubular y sobrecalentado a cerca de 759 grados F. Los vapores pasan hacia abajo, a través de una torre catalizadora, donde el azufre orgánico se descomponer en sulfato de hidrógeno y el correspondiente hidrocarburo. La extracción del sulfato de hidrógeno del producto desulfurado se efectúa por lavado cáustico o lavado con agua o combinación de ambos. La regeneración del catalizador se efectúa quemando en su punto, en una atmósfera de oxígeno regulado, o puede hacerse en un quemador de arcilla exterior. Se dice que los catalizadores han sido regenerados de quince a veinte veces sin sufrir apreciable pérdida en rendimiento.

La ventaja en tratar las gasolina de cracking o gasolinas semiacabadas está en los mayores números octano y la mejor respuesta al plomo. Se dice que la ganancia llega a varios números octano. A este procedimiento se presenta también un posible campo en la desulfuración de materiales de alimentación diversos para promover la efectividad del procedimiento de polimerización.

El procedimiento Gray de arcilla caliente es otro de importancia en la actualidad. La gasolina se evapora y se pasa por una capa de arcilla ordinaria a una temperatura de 700 grados F. Se quita el azufre y se mejora así considerablemente el número octano y la susceptibilidad al plomo de la gasolina.

Otra reciente instalación de importancia es la Edeleanu de extracción de bióxido de azufre, para la preparación de naftas de alta solvencia y disolventes de limpieza sin olor de los crudos Mid-Continent. También se produce un material insecticida sin olor.

El lecitin, obtenido de la soya, se ha hecho ultimamente prominente como un aditivo a la gasolina. Es una glicerna modificada, que contiene fósforo y nitrógeno. Pequeñas cantidades de este material dan estabilidad a la gasolina contra el enturbamiento y reduce, al mismo tiempo, la corrosión. Esta última ventaje es de suma importancia en gasolina de aviación almacenada en tambores de acero.

## Lubricantes

Pocos han sido los desarrollos en procedimientos de preparación de aceites lubricantes durante el año pasado. La tendencia es todavía hacia la producción de aceites de mayor resistencia inicial a la oxidación y la extracción por solvente es el medio generalmente usado. Los procedimientos de solvente sencillo se emplean mucho al tratarse de materiales livianos y el tipo de doble solvente, o doble solvente más la deasfaltación de propano se aplican a los materiales pesados. Por supuesto, no se puede trazar una línea fija entre los límites de los varios procedimientos.

En mayor énfasis en el campo de aceites lubricantes recientemente ha sido sobre la adición de agentes para mejorar los resultados en el servicio. Estos agentes sirven para añadir resistencia a oxidación, detergencia y resistencia a corrosión en los aceites de motor. Entre los muchos tipos de materiales disponibles ahora tenemos los eteres naturales sulfurizados y sintéticos, olefinas alifáticas sulfurizadas, fosfitos y fosfatos orgánicos, jabones clorinados y metálicos.

El método corriente de quitar el petróleo de la cera cruda es calentándolo. Esta práctica es muy antigua y se sigue todavía mucho. Una nueva idea es el procedimiento Schutte, en el cual la cera se emulsifica con agua y el petróleo se separa por fuerza centrífuga.

En la Costa del Golfo se hizo recientemente un instalación en la cual se elimina la "transpiración" de una

is the Schutte process, where the wax is emulsified with water and centrifuged to effect oil removal.

A recent installation was made on the Gulf Coast, wherein sweating was eliminated in a novel manner. The slack wax from a methyl ethyl ketone dewaxing unit is passed through a two-stage distillation unit. The wax which results from this stripping operation is run to intermediate storage and is then passed to a rotary vacuum filter for a second deoiling operation. This is done in lieu of sweating. A very high ratio of solvent is used in this step, the volume of solvent equaling 15 times the volume of slack wax charged. The solvent is recovered and the wax is now classified as crude scale or semirefined.

If the wax is to be offered as finished, semirefined, it is treated with sulfuric acid, neutralized with caustic and water washed. The wax is then deodorized by contacting with superheated steam at about 350° F., in a small bubble tower. From the deodorizer, the molten wax is percolated through earth and run to storage. If the wax is to be made as fully refined, it is subjected to a third solvent processing prior to the acid treatment.

A new application in the sweating of wax is called fractional fusion. The change is principally one of technique. Apparently, as the result

manera nueva muy interesante. La cera de una instalación desparafinadora M.E.K. se pasa por un grupo de destilación de 2 etapas. La cera que resulta de esta operación rectificadora se pasa a un depósito intermediario y luego a un filtro al vacío giratorio para una segunda operación de extracción de petróleo. Esto se hace en lugar de la transpiración. Una gran proporción de solvente se usa en esta operación, quedando éste en relación de 15 veces la cantidad de material de carga puesto. El solvente se recobra y la cera queda ahora clasificada como cruda o semirefinada.

Si la cera ha de ofrecerse como acabada, semirefinada, se trata con ácido sulfúrico, se neutraliza con cáustico y se lava con agua. Se le quita en seguida el olor mediante contacto con vapor recalentado a cerca de 350 grados F. en una torre pequeña. Del deodorizador, la cera derretida se cuela por tierra y va al depósito. Si la cera ha de hacerse completamente refinada, se somete entonces a la acción de un tercer solvente, antes de su tratamiento con ácido.

Una nueva aplicación en la transpiración de cera se llama fusión fraccional. El cambio es principalmente una de técnica. Aparentemente, como el resultado de un exacto control del calor y uniformidad de aplicación, el tiempo se reduce a la mitad.


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SAVES — space insulation
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ELIMINATES — packing maintenance
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DURABLE — under high temperatures under pressure under corrosion
DURABLE — bajo altas temperaturas bajo presión bajo corrosión
FUNCTIONS — to the exclusive Directed Flexing design with all curve corrugations and corresponding equalizing rings acting to distribute flexing stresses.
FUNCIONA — de una manera eficaz, debido a su exclusivo tipo de Flexión Dirigida, con todas las corrugaciones de curva y correspondientes anillos de compensación actuando para distribuir las tensiones de la flexión.

THE above just about covers everything that concerns the problem of expansion in hot oil or gas lines and how to take care of this inevitable movement with a compact, long-lived, maintenance-free expansion joint.

LO dicho cubre casi todo lo que se refiere al problema de la dilatación en tuberías de petróleo caliente o gas, y cómo manejar este inevitable movimiento con una junta o unión de expansión compacta, durable y exenta de conservación.

E. B. BADGER & SONS CO.
75 PITTS STREET BOSTON, MASS.
*Agents in Principal Cities*

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*Accidents like this do not "just happen" either . . . they are caused. Reduce the hazard of such possibilities by using INFERNO Boiler Safety Units*

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3 POSITIVE ACTIONS

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The INFERNO Safety Unit may be combined with the INFERNO Automatic Pump Governor or INFERNO Automatic Pump Control Valve for starting and stopping pumps.

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USED THE WORLD OVER

THE INFERNO CO.
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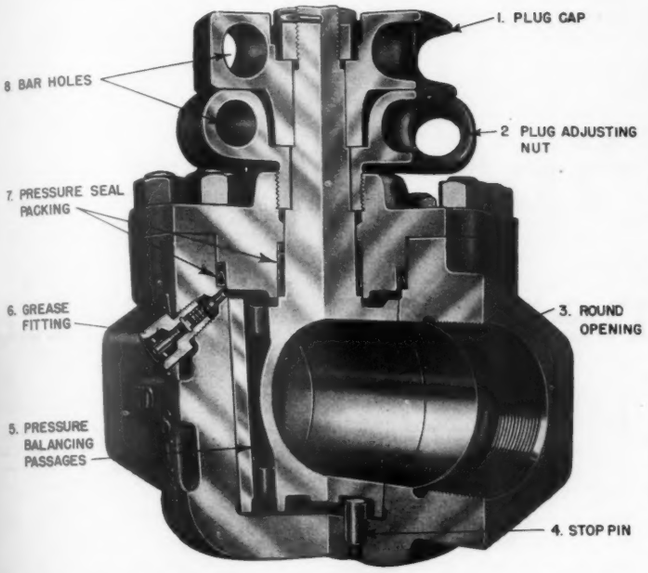
# HAMER PLUG VALVES




CONSTRUCTION OF A TYPICAL HAMER PRESSURE-BALANCED PLUG VALVE

CONSTRUCCIÓN DE UNA TÍPICA VÁLVULA DE OBTURACIÓN HAMER DE PRESIÓN COMPENSADA

## TYPES FOR *ALL* OIL COUNTRY SERVICES

Hamer Plug Valves are designed especially for oil industry applications. They are the product of years of development work in the oil fields, and long manufacturing experience. Service records show that they are superior in performance and cost less to operate than ordinary plug valves.

Hamer Plug Valves offer these valuable advantages: A—They are always easy to open and close under high line pressure. B—THEY CANNOT STICK. C—The plug can be raised quickly to a free-turning position, and adjusted to the proper drag-fit in the body by means of the plug adjusting nut.

The construction and operation of Hamer Plug Valves are shown in the cross view. 1—*Plug Cap*—turned by a bar to open and close the valve. 2—*Plug Adjusting Nut*—raises the plug to a free-turning position when turned to the left; adjust the plug to the proper drag-fit in the body when turned to the right. 3—*Round Opening*—equal to or greater than the inside diameter of the pipe. 4—*Stop Pin*—insures perfect alignment of opening and complete closing of valve. 5—*Pressure Balancing Passages*—equalize lubricant pressure above and below the plug. 6—*Grease Fitting*—for pressure lubrication of plug with ordinary alemite gun. 7—*Pressure Seal Packing*—retains lubricant. 8—*Bar Holes*—eliminate need for special wrenches.

Hamer Plug Valves are available with or without gearing, in lubricated, non-lubricated and grease seal types. Send for new General Catalog and prices.

## TIPOS PARA SERVICIO EN TODO PAÍS PETROLERO

Las válvulas de obturación Hamer se fabrican especialmente para aplicaciones en la industria del petróleo. Son el producto de años de experiencia práctica en los campos petrolíferos y en actividades fabriles. Los registros de servicio muestran que son superiores en funcionamiento y cuestan menos en operación que las válvulas obturación ordinarias.

Las válvulas de obturación Hamer ofrecen estas valiosas ventajas: A—Siempre se abren y cierran con facilidad bajo alta presión de línea. B—NO PUEDEN ATASCARSE. C—El obturador puede levantarse rápidamente a una posición de rotación libre, y se ajusta al correcto punto en el cuerpo por medio de una tuerca reguladora.

La construcción y funcionamiento de las válvulas de obturación Hamer se muestran en la vista diagramática seccional. 1—*Casquillo del obturador*—girado por una barra para abrir y cerrar la válvula. 2—*Tuerca reguladora del obturador*—levanta el obturador a una posición de rotación libre cuando se gira a la izquierda; ajusta el obturador el correcto punto en el cuerpo cuando se gira a la derecha. 3—*Abertura circular*—igual o mayor que el diámetro interior del tubo. 4—*Pasador de tope*—asegura perfecta alineación de abertura y completo cierre de la válvula. 5—*Conductos de compensación de presión*—igualan la presión del lubricante arriba y abajo del obturador. 6—*Conexión de engrase*—para la lubricación bajo presión del obturador con una pistola Alemite ordinaria. 7—*Empaquetadura de cierre de presión*—retiene el lubricante. 8—*Agujeros de barra*—eliminan la necesidad de llaves especiales.

Las válvulas de obturación Hamer se ofrecen con engranajes o sin ellos, en tipos lubricados, no lubricados y de cierre de grasa. Pídanos nuestro catálogo general y precios.

# HAMER LINE BLINDS

### INSURE A QUICK, POSITIVE SHUT-OFF

**OPERATED BY ONE MAN**

Hamer manufactures the world's most extensive variety of Line Blinds. One man can change the line from full-open to a positively shut-off condition in from one to two minutes.

**MANEJADOS POR UN HOMBRE SOLO**

La Hamer fabrica el surtido más grande del mundo de obturadores de tubería. Un hombre solo puede cambiar la línea de tubería de la posición de abertura completa a la de cierre positivo en uno o dos minutos.

**LOW PRESSURE LINE BLINDS**

Plate is released or sealed off by turning the nut with a bar. All-steel construction; tested to 500 P.S.I. Low in cost; especially designed for refineries.

**OBTURADORES DE TUBERIA DE BAJA PRESION**

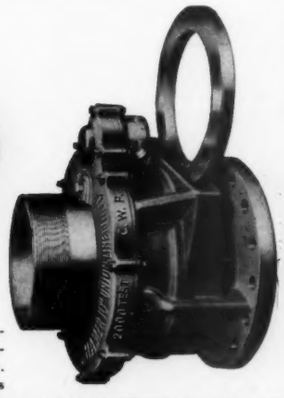
La placa se suelta o cierra girando una tuerca con una barra. Construcción enteramente de acero; ensayada a 500 libras. Económicos en costo; especialmente fabricados para refinerías.

**BOLTED BLINDING FLANGES**

Insure a permanent, positive shut-off of light inflammable fluids and gas. Enclosed body prevents drainage of line fluid while plate is being reversed. Operated with ordinary wrench or bar.

**REBORDES OBTURADORES EMPERNADOS**

Aseguran cierre permanente y positivo de líquidos volátiles inflamables y gas. En cuerpo tapado impide el drenaje del flúido mientras la placa se invierte. Se acciona con una llava o barra ordinaria.



**HIGH PRESSURE LINE BLINDS**

Geared for easy operation under high pressure. Plate reversed in one minute by one man. All parts fully enclosed; tested to 1200 or 2000 P.S.I. All steel construction.

**OBTURADORES DE TUBERIA DE ALTA PRESION**

Con engranaje para fácil operación bajo alta presión. La placa se invierte en un minuto por un hombre solo. Todas las piezas bien protegidas. Ensayados a 1200 o 2000 libras. Construcción de acero.

HAMER OIL TOOL CO.
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of close control of the heat flow together with uniformity of application, the time of sweating a batch is cut in half.

A substantial quantity of the equipment is devoted to regulation of heat and includes an evaporative cooler, steam-heating unit, circulating fan, distributing ducts in the room, and pipe coils in the pans. The wax mass is cooled under close control, each constituent freezing separately as cooling proceeds, until pans contain total solids. Closely controlled heat is then applied under time-temperature control until all waxes up to the highest melting point are melted out.

Una gran parte del equipo se dedica a la regulación del calor y comprende un enfriador evaporativo, grupo de calentador de vapor, ventilador de circulación, conductos de distribución en la sala, y serpentines en los recipientes. La masa de cera se enfría bajo control exacto, con cada constituyente congelándose separadamente a medida que avanza el enfriamiento, hasta que los recipientes contienen sólidos totales. El calor exactamente controlado se aplica entonces bajo control de tiempo y temperatura hasta que todas las ceras, incluyendo las de más alto punto de derretimiento, se separan por derretimiento.

# Operation of Pipe Lines

# Operacion de Lineas de Tuberia

THE importance of pipe-line transportation has never been more apparent than it is this year. Large pipe-line projects are being planned and undertaken which will free tankers from coastwise service making them available for deliveries to Britain and Russia. Growing appreciation of the advantages offered by this economical means of transportation is resulting in greater use of pipe lines for transporting gasoline and crude oil to areas which have been served by railroads and tankers. Expanding defense industries are making demands for fuel which require considerable extension of natural-gas transmission lines.

By the use of modern photogrammetric methods it is possible to study all important features of a pipe-line route before a ground survey is made. In preparing for a 1,586-mile crude-oil pipe line which may connect East Texas and Wood River, Ill., with New York and Philadelphia refining areas, photographic maps were completed in approximately 1 month. Aerial photographs were taken from two planes in less than 3 weeks. After the photographs were examined through a stereoscope, the route was marked on mosaic-strip maps about 50 ft. long representing 100 miles on the ground. When these maps later were taken into the field, it was found that in following the indicated route for several hundred miles it was necessary to make few changes. Where the route traversed thickly settled industrial areas in eastern states, it was necessary to have the route of the line located by engineering firms familiar with the location of water, gas, and electric lines installed by utilities.

## Pipe-Line Construction

More innovations have been introduced into pipe-line construction in 1941 then in any previous year. An outstanding example is the use made of factory bends in the 400-mile 26-in. lines laid for looping the main trunk line of Natural Gas Pipeline Co. of America. Factory bends consist of curved nipples a few feet long bent at angles of 1°, 2°, 3°, 4°, and 5°. By combining these it is possible to make bends of any degree desired. The use of factory bends made it possible to use pipe with the unusual wall thickness of ¼ in. By using thin-wall pipe of high-tensile steel, adequate provision was made for operating requirements of the line and at the same time substantial savings were effected due to the reduced tonnage which cuts down the original cost of the pipe as well as the cost of transportation and laying. Bending of pipe by hot bending and cold bending methods was entirely elimi-

*(Continued on Page 256)*

LA importancia del transporte por línea de tubería nunca ha sido más evidente que este año. Grandes proyectos de líneas de tubería, bajo estudio y bajo construcción, permitirán que los buques tanques se desprendan del servicio costanero nacional, para utilizarse en las entregas a Inglaterra y Rusia. La creciente apreciación de las ventajas ofrecidas por este económico medio de transporte está resultando en un uso más extenso de las líneas de tubería para el transporte de gasolina y petróleo crudo a lugares que hasta ahora han sido servidos por ferrocarriles y buques tanques. La expansión de las industrias dedicadas a productos de defensa están exigiendo grandes cantidades de combustible, lo cual requiere una considerable extensión de las líneas de tubería para el transporte de gas natural.

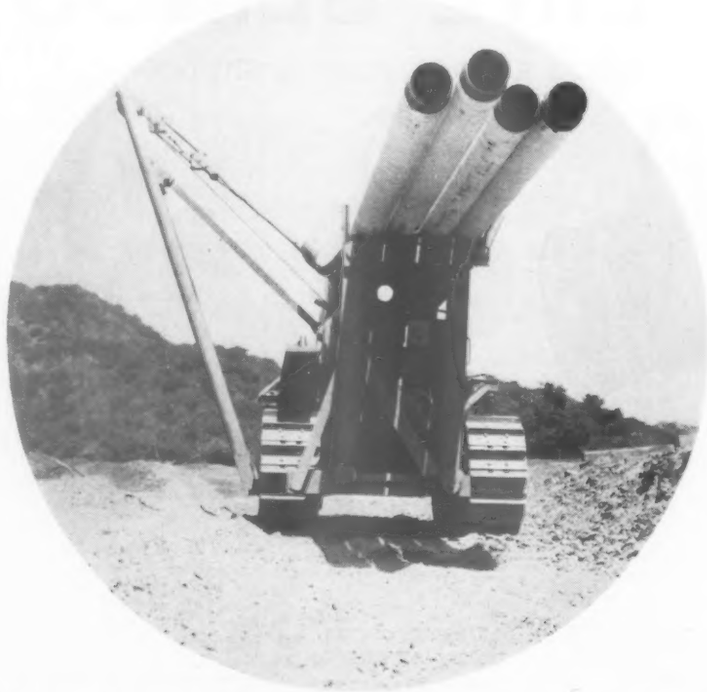
## Estudios aereos

Mediante el aprovechamiento de los modernos métodos fotogramétricos, es posible estudiar todos los rasgos importantes de la ruta de una línea de tubería, antes de hacerse una exploración terrenal. En la preparación de una línea de tubería de petróleo crudo, de 1.586 millas de longitud, para conectar East Texas y Wood River, Ill., con las zonas de refinería de Nueva York y Filadelfia, se hicieron mapas fotográficos en más o menos un mes. Las fotografías aéreas se tomaron de dos aviones en menos de tres semanas. Después de ser examinadas las fotografías, mediante un estereoscopio, las rutas se marcaron en mapas en la forma de tiras de casi 50 piés de largo, que representaban 100 millas de terreno. Cuando estos mapas se llevaron más tarde al campo, se vió que siguiendo la ruta indicada por varios centenares de millas, se hizo necesario hacer muy pocos cambios. Donde la ruta pasaba por regiones industriales densamente pobladas, en los estados del este, se hizo necesario encargar la localización de la ruta de la línea a firmas de ingenieros al corriente de la posición de las líneas de agua, gas y electricidad instaladas por las empresas de servicios públicos.

## Construcción de líneas de tubería

Más innovaciones se han introducido en la construcción de líneas de tubería en 1941 que en todo otro año anterior. Un ejemplo interesante es el uso que se hace de codos o curvas de fábrica en las líneas de 400 millas de tubería de 26 pulgadas tendidas para dar curva a la línea principal de la Natural Gas Pipeline Co. of America. Los codos de fábrica consisten en niples curvos de unos pocos piés de largo doblados a ángulos de 1, 2, 3, 4 y 5 grados. Combi-

*(Continue en Pagina 256)*



*Special rack for carrying joints of 10-in. pipe on top of tractor during the construction of an 86-mile crude-oil pipe line for Shell Oil Co., Inc., in California. The rack is made so that it can be lowered sideways to a position close to the ground where pipe may be easily loaded and unloaded*

*Soporte especial para transportar uniones de tubo de 10 pulgadas encima del tractor durante la construcción de la línea de tubería de petróleo crudo de 86 millas de la Shell Oil Co., Inc., en California. El soporte está dispuesto de modo que puede bajarse por un lado a una posición cerca del suelo donde puede hacerse facilmente la carga o descarga de los tubos*

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## Oil Field Specials

### ICE WATER CAN

Keeps water cool, fresh and clean. Heavy galvanized construction, with insulating chamber around entire can. Bottom is protected against breakage with special fiber insulation. Note — deep extra seal lid.

### ICE WATER COOLER

Same guaranteed construction as the Water Can. Has larger top opening, and 1" insulator in bottom.

Ask for Allen's at your supply house or hardware dealer.

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Fairfax, Oklahoma



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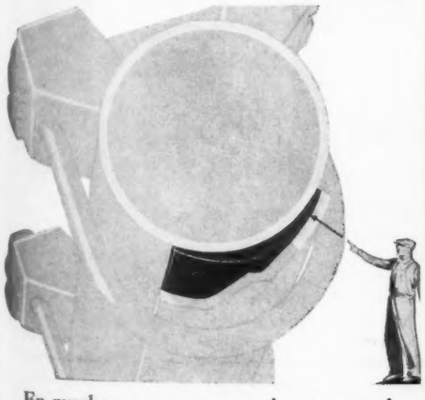

En muchos casos, reparaciones examinadas después de 5 años de servicio, las EMPAQUETADURAS GRO-CORD no mostraron ningún indicio de deterioración.

**LIMA CORD SOLE & HEEL CO.**
**Lima, Ohio, U. S. A.**

Fabrican·te las famosas suelas y tacones GRO-CORD



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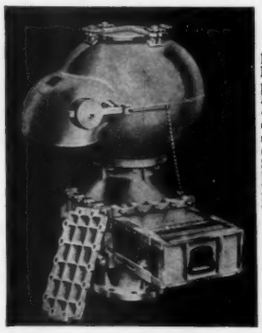


*Figure No. 58A*

**CONSERVATION VENT UNIT FOR TANKS**

**Pressure & Vacuum Relief Valve with Hyperbolic Pallets, & Flame Arrester with extensible bank. Greater flow capacity. All aluminum. Non-corrosive. Inside Flame Snuffer. Fully listed by the Underwriters' Laboratories. Sizes 2" to 10".**

**UNIDAD DE RESPIRACION PARA CONSERVACION DE TANQUES**

**Válvula de desahogo de presión y vacío con paletas hiperbólicas y detenedor de llama con banco extensible.** Mayor capacidad de corriente. Toda de aluminio. No puede corroerse. Apagador de llama interior. Completamente aprobado por los laboratorios de compañías de seguro. Tamaños de 2 a 10".

**SAFETY TANK WINCH**

Rated capacities 1500-lbs., 2500-lbs., 5000-lbs., with only 50-lbs. handle load. Designed for 100% overload. Timken Thrust Bearings. Bronze Bushings. Worm gear construction. Positive lock.

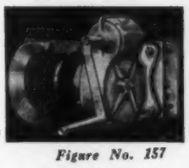


*Figure No. 157*

**MALACATE DE TANQUE DE SEGURIDAD**

Capacidades nominales de 1500, 2500, 5000 libras, con sólo 50 libras de carga de mango. Construido para una sobrecarga de 100%. Cojinetes de empuje Timken. Bujes de bronce. Construcción de engranaje de tornillo sin fin. Cierre positivo.

**CABLE SHEAVE BRACKET**

For all types of tank roofs, with or without lubricated packing gland to fit any size cable; with or without demountable top. Available for Welding, Riveting, or Bolting.

*Figure No. 135*

**SOSTEN DE ROLDANA DE CABLE**

Para todo tipo de techo de tanque, con o sin prensaestopa lubricado, para adaptarse a cualquier cable; con o sin tope desmontable. Unión por soldadura, remanche o perno.

*Figure No. 40*

*Figure No. 220*

**GAUGE AND THIEF HOLE COVER**

Aluminum. Noncorrosive. Gastight. Self-closing. Nonsparking. Also Pressure Types. Sizes 4" to 10".

**INDICADOR Y TAPA DE PROBADOR DE MUESTRA**

De aluminio. No puede corroerse. Hermético al gas. Cierre automático. No produce chispa. También tipos de presión. Tamaños de 4 a 10".

**MANHOLE COVER**

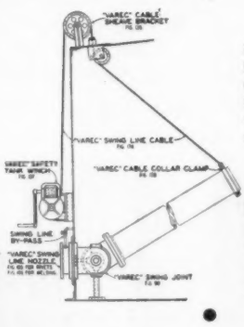
Semisteel cover, steel cross beam, sparkproof bushings & seating contacts. Gastight. Riveting, Bolting or Welding. Sizes 18" and 20".

**CUBIERTA DE PASO DE HOMBRE**

Cubierta o tapa de semiacero, con viga transversal de acero, bujes y contactos de asiento a prueba de chispa. Hermética al gas. Remachada, asegurada por pernos o soldada. Tamaños de 18 y 20".

**SWING LINE ASSEMBLY**

Installation diagram of fittings shown in this column. Ask for Drawing C-S-19 to see "pull-up" with "pull-down" assembly.




**GRUPO DE LINEA GIRATORIA**

En esta columna mostramos diagrama de instalación de las conexiones. Pida plano C-S-19 para ver el grupo de subida y de bajada.

**GASTIGHT GAUGING AND SAMPLING UNIT**

Accurate gauges, temperatures, and spot of running samples. Cast aluminum Portable Head, semisteel Body, and Plug Gate Valve. All 18-8 stainless steel and bronze trim. Pressure 50-lbs. Sizes 2" and 4". Thermometer and Sampling Bomb optional.

**UNIDAD DE INDICADOR Y PROBADOR DE MUESTRA HERMETICA AL GAS**

Indica exactamente las temperaturas y prueba muestras fijas o corrientes. Cabeza portátil de aluminio fundido, cuerpo de semiacero y válvula de compuerta de tapón. Acero inoxidable de 18-8 y guarniciones de bronze. Presión de 50 libras. Tamaños de 2 a 4". Termómetro y dispotivo de muestra a elección.

*Figure No. 410*

**SWING JOINT**

Progressively expanding passageways. Streamline flow capacity. Tongue and grooved joint. Cast iron. Flanged or screwed. Cannot leak. Sizes 2" to 10".

**UNION GIRATORIA**

Conductos de extensión progressiva. Capacidad máxima de corriente de paso. Unión ranura y lengueta. De hierro fundido. Con reborde o rosca. No produce escape. Tamaños de 2 a 10".

*Figure No. 90*

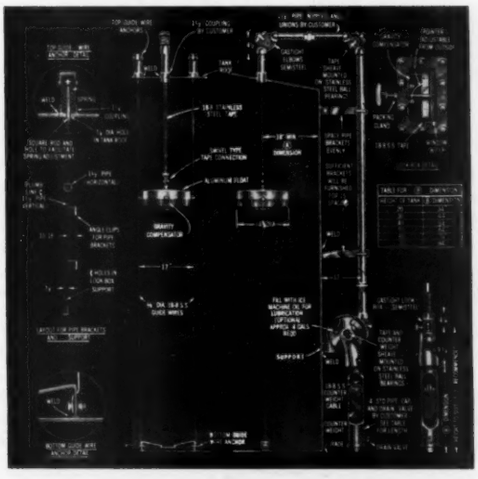


*Figure No. 253*

**SWING LINE NOZZLE**

Bolting, Riveting, or Welding to tank shell. Flanged for outside piping and studded inside to receive flanged Swing Joint. Screwed connections as required. Any series flanges as specified. Sizes 3" to 10".

**BOQUILLA DE LINEA GIRATORIA**

De conexión por pernos, remaches o soldadura al casco del tanque. Con reborde para tubería exterior y ranurada por dentro para admitir unión giratoria con reborde. Conexiones de tornillo, como se pidan. Cualquier tamaño de reborde que se especifique. Tamaños de 3 a 10".

*Figure No. 304*

**GASTIGHT AUTOMATIC TANK GAUGE**

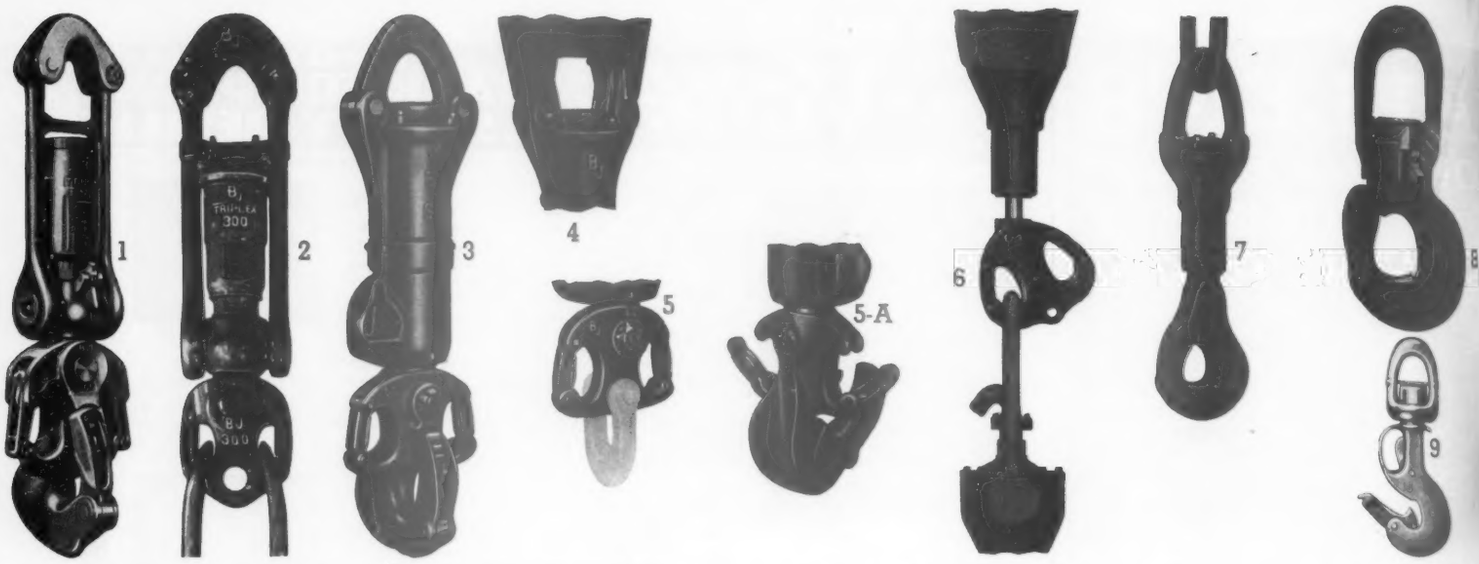
Adaptable to *any type* or size of tank by proper fittings. Available for any working pressure. Accurate to 1/16 in. Gravity Compensator adjusts for changes in gravity when fluid is changed. Sparkproof, noncorrosive, inexpensive.

**MANOMETRO AUTOMATICO DE TANQUE HERMETICO AL GAS**

Se adapta a cualquier tipo o tamaño de tanque mediante correctas conexiones. Se ofrece para cualquiera presión de trabajo. Exacto hasta 1/16". El compensador de gravedad se ajusta a los cambios de peso específicio cuando se cambia el liquido. A prueba de chispa no se corroe. De precio económico.

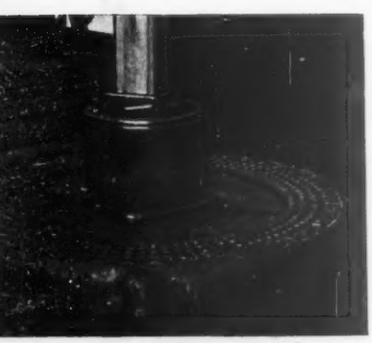
*"The Pace Setter Since 1928"* — *"La norma desde 1928"*

**The VAPOR RECOVERY SYSTEMS CO., COMPTON, CALIFORNIA, U.S.A.**
NEW YORK CITY -- HOUSTON, TEXAS -- CLEVELAND, OHIO -- TULSA, OKLAHOMA




(1) BJ Triplex Hooks—with safe locking arms—are made in sizes for 60, 125, 150, 200 and 300-ton loads. (2) This DUPLEX Body exchanges with the TRIPLEX Body by removing only one pin. (3) The "60" Triplex Hook has a recessed swivel lock to prevent rotation. All locking arms are open in view (5-A) to show details; (4) shows direct connection to the traveling block; the clevis (5) is optional—New BJ Combination Tubing Hooks are made for 50-ton and 75-ton loads, and, by removing one pin, can be changed from a SINGLE Body (7) to a DUPLEX Body (6) for work-over or perforation cleaning jobs. The 30-ton Tubing Hook (8) has SINGLE Body only —There are BJ Rod Hooks for 10-ton loads (9) also for 15 and 20 tons, all with strong, safe locking arms.

(1) Ganchos Triplex BJ—con brazos de cierre de seguridad—se ofrecen en tamaños para cargas de 60, 125, 150, 200 y 300 toneladas. (2) Este cuerpo DUPLEX se intercambia con el cuerpo TRIPLEX quitándole sólo un pasador. (2) El gancho Triplex "60" tiene un cierre deprimido para evitar la rotación. Todos los brazos de cierre se ven abiertos en la vista (5-A) para mostrar los detalles; (4) muestra la conexión directa al bloque de movimiento; la horquilla (5 es opcional.—Los nuevos ganchos de combinación BJ para tubería se ofrecen para cargas de 50 y 75 toneladas, y quitando un pasador, pueden cambiarse de cuerpo SENCILLO (7) a cuerpo DUPLEX (6) para trabajos corrientes o de perforación. El gancho para tubería de 30 toneladas (8) tiene cuerpo SENCILLO solamente.—Hay ganchos JB para varillas de bomba, para cargas de 10 toneladas (9) y también para 15 y 20 toneladas, todos con firmes y seguros brazos de cierre.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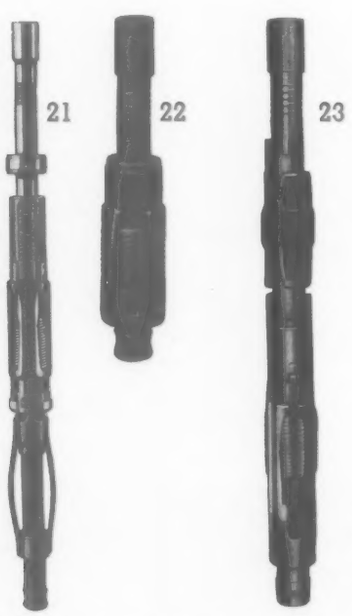


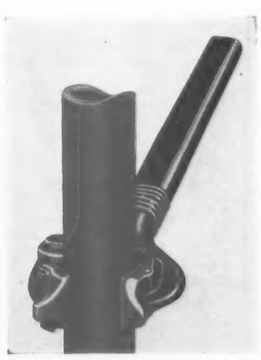
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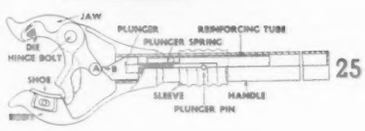


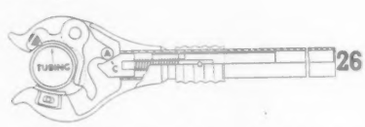

BJ Kelly Bushings (19-20) are successful because they have a shock-absorbing rubber cushion between slips and body; and anti-friction liners. BJ Tubing Catchers (21-22) protect the tubing at all times; may be anchored to stop tubing movement while pumping. Casing Pumps are run-in on sucker rods, then set where desired with the BJ Casing Pump Anchor (23). The new BJ Type TC Tubing Tong (24) remains open (25) until "stabbed" on the tubing (26); a strong spring holds tong safe in place. (27) With a BJ Elliott Wire Line Core Drill you can drill and core in any order you wish, without removing the drilling string from the well. Core Catcher (28) recovers cores from hard formations; (29) from loose sands. Hard Rock Bits (30) or 3-Way Bits (31) are both efficient. (32) BJ (Wilson) Perfection Underreamers never have been equalled for cable tool operation.

Los bujes para kelly (19-20) funcionan muy bien porque tienen un cojín amortiguador de golpe entre las cuñas y el cuerpo, y forros anti-fricción. Los pescatubos BJ (21-22) dan protección a la tubería en todo momento; pueden anclarse para detener el movimiento de la tubería durante el bombaje. Las bombas de tubería van en varillas de bomba y luego de fijan en el punto que se quiera con el ancla de bomba de tubería BJ (23). Las nuevas tenazas de tubería BJ de tipo TC (24) permanecen abiertas (25) hasta que tocan la tubería (26); un fuerte resorte las mantiene seguras en su sitio. (27) Con una sonda o perforadora de exploración BJ Elliott de cable de alambre, se puede perforar y sacar núcleos en cualquier orden que se desee, sin quitar la cadena de perforación del pozo. El sacanúcleos (28) saca muestras de formaciones duras; (29) de arenas blandas. Las barrenas de roca dura (30) y las barrenas de tres aletas (31) son todas muy eficaces. (32) Los escariadores ensanchadores BJ (Wilson) Perfection nunca han sido igualados para trabajo con herramienta de cable.

BYRON JACKSON CO., Box 2017 Terminal Annex,
Los Angeles, California.
Please send free copy of the BJ 1942 OIL TOOL CATALOG

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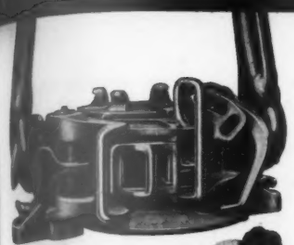
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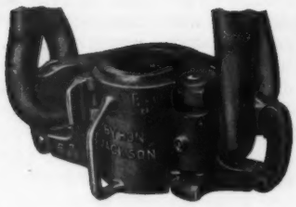
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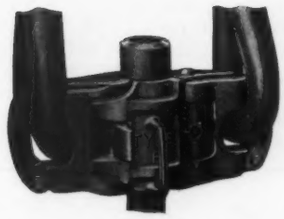
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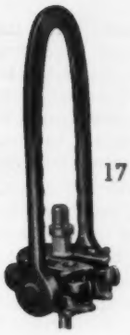
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18

(10) BJ Slip Casing Elevators land the heaviest strings without lifting under collar or coupling. BJ Casing Spiders (11) are safe, easy to operate and do not crush the pipe—New Wire Line Handles (12) make BJ Weldless Links better than ever—Type AA Elevators (13) are made for 300-ton loads; there are two smaller "A" Types also. Type MG Elevators (14) handle external upset drill pipe without using lifting plugs. The Type D (15) is a safe modern elevator for collar type pipe; the Type B (16) is a side door elevator for external upset pipe—BJ Rod Elevators (17) hold sucker rods in vertical position and have latches both front and rear for easy operation; the bail rests at a proper angle (18) for a quick, safe pick-up by the BJ Rod Hook.

(10) Los elevadores BJ para tuberías colocan las cadenas de tubería más pesadas sin levantamiento por debajo del collar o acoplamiento. Las arañas BJ pata tubería (11) son seguras, fáciles de manejar y no dañan al tubo.—Los nuevos mangos de cable de alambre (12) hacen que los eslabones BJ sin soldadura sean mejores que nunca.—Los elevadores de tipo AA (13) se hacen para cargas de 300 toneladas; hay también dos tipos "A" más pequeños. Los elevadores de tipo MG (14) manejan tubo de perforación con recalco exterior sin usar tapones de levantamiento. El tipo D (15) es un elevador moderno muy seguro para tubo de tipo de collar; el tipo B (16) es un elevador de puerta lateral para tubo de recalco exterior.—Los elevadores BJ de varillas de bomba (17) sujeta las varillas en posición vertical y tienen pestillos al frente y atrás para facilitar el trabajo; el achicador queda a conveniente ángulo (18) para su enganche rápido y seguro con el gancho BJ.

33

34

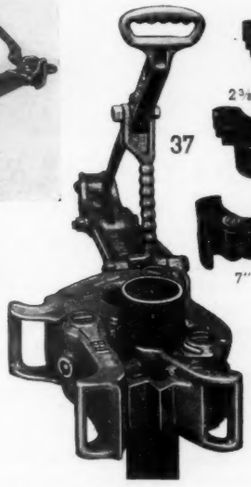
35

6⅝" to 9"

3½" to 5"

9" to 10¾"

36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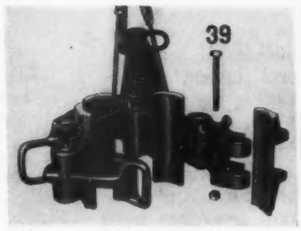
2⅜" to 4¼"

5" to 7"

7" to 8⅝"

38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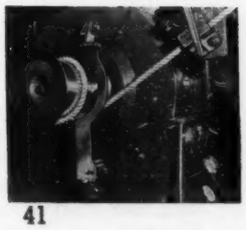
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The new BJ Type B Rotary Tongs fit pipe sizes from 3½ inches to 10¾ inches by merely changing one jaw. See how the same jaw fits 6¾ inch; 5¾ inch; and 4½ inch pipe—(33-34-35). Replaceable hardened bushings prevent wear in jaw sections. The rigid suspension is of sturdy construction, and collapses flat on the tong (36) when moving to another well —The Type C Tongs (37) fits from 2⅜ inches to 8⅝ inches by installing the proper size jaw, and is light and handy to use—When casing is used for the drilling string, BJ Drill Casing Bushings (38-39) unscrew tight joints without crushing the casing; also used for thin or worn casing — The BJ Cat-Line Grip (40) and BJ Rope Guard (41) are modern devices which speed up operations and safeguard crews.

Las nuevas tenzas BJ giratorias, de tipo B, se adaptan a tubería de 3½ a 10¾" cambiando sencillamente una mandíbula. Vea cómo la misma mandíbula ajusta a un tubo de 6¾, 5¾ y 4½"—(33-34-35). Los bujes endurecidos renovables evitan el desgaste de las secciones de las mandíbulas. La suspensión rígida es de firme construcción, y se suelta de plano en las tenaza (36) al llevarse a otro pozo.—Las tenazas de tipo C (37) se ajustan a tubo de 2⅜ a 8⅝" instalando la mandíbula de correspondiente tamaño, y se usan con facilidad.—Cuando se usa tubería de revestimiento para la cadena de perforación, los bujes BJ para tubería de perforación (38-39) destornilla las uniones apretadas sin aplastar la tubería; también se usan para tubería delgada o desgastada.—El asidero BJ (40) para cable de cabrestante y el rescuardo de cable BJ (41) son dispositivos modernos para acelerar el trabajo y dar protección a los operarios.

# BYRON JACKSON CO.

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*General Office:* 2150 East Slauson Ave., Los Angeles, Calif.
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PLEASE REFER TO THE BJ SECTION IN THE 1942 COMPOSITE CATALOG FOR COMPLETE DESCRIPTIONS OF ALL BJ OIL TOOLS.

SIRVASE VER LA SECCION BJ EN EL CATALOGO COMPUESTO DE 1942 PARA DESCRIPCION COMPLETA DE TODAS LAS HERRAMIENTAS BJ PARA PETROLEO.

nated. With these methods there would have been a possibility that the pipe might be injured. The work of installing bends progressed smoothly and those directing construction have expressed themselves as being well satisfied with the results.

The 400 miles of 26-in. pipe was laid in five loops within 50 to 150 ft. of a 24-in. line laid in 1930 to Chicago. The new loops will increase the daily capacity of the system 50,000,000 cu. ft. Specifications for the loops called for laying at the rate of ⅝ mile per day. Under normal conditions when sufficient pipe was available, this rate was 1 mile or more per day. In the construction of these loops it was observed that even though modern equipment and methods are more efficient than they were a decade ago when the first line was laid, the daily rate of progress is similar. This has been explained by construction men as being due to the fact that speed of moving heavy equipment is restricted when it is engaged in handling large-diameter pipe which requires special attention to safeguard it at all stages of the work.

This year the pipe-line industry has widely adopted the practice of solid welding large-diameter lines as well as lines made of smaller pipe. Solid welding eliminates the use of couplings and it is usually

nando estos codos, se pueden hacer curvas de cualquier grado deseado. Estos codos de fábrica hacen posible usar tubería del extraordinario espesor de pared de ¼ pulgada. Usando tubería de pared delagada de acero de alta tensión, se hizo adecuada provisión para los requisitos de operación de la línea, y al mismo tiempo, se efectuaron considerables economías, debido al reducido tonelaje, lo cual reduce el costo original de la tubería, lo mismo que el costo de su transporte e instalación. La dobladura de la tubería por métodos termales de calor y de frío, se suprimieron por completo. Con estos métodos se habría presentado la posibilidad de dañar la tubería. El trabajo de instalar estos codos progresó sin dificultad y los directores de la construcción han expresado su completa satisfacción con los resultados obtenidos.

Las 400 millas de tubería de 26 pulgadas fué tendida en 5 vueltas dentro de 50 a 150 piés de una línea de 24 pulgadas tendida en 1930 en la dirección de Chicago. Las nuevas vueltas aumentarán la capacidad diaria del sistema en como 50.000.000 de piés cúbicos. Los características de las vueltas exigieron su tendido a razón de ⅝ de milla al día. Bajo condiciones normales, cuando había suficiente abastecimiento de tubería disponible, el tendido se hacía a razón de una milla al día. En la construc-

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3/4 YARD 1/2 YARD 3/8 YARD

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Su construcción de aleación de acero laminado les imparte la firmeza para resistir el trabajo más exigente . . . Verdaderos carriles de tractores proveen tracción segura por todas las condiciones de suelo que se presenten . . . Y los gobiernos hidráulicos P&H hacen que sean las máquinas de funcionamiento más expedito del mercado. Estas máquinas le ofrecen más ventajas que todas las demás. Pídanos información completa.

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## Pipe Protection

Practices followed in recent years for coating, wrapping, and cathodic protection of pipe are continued with improvements developed through experience. The test of time shows the importance of thoroughly cleaning pipe before applying primer and coating. In fact it is now recognized that if the industry had not had power-driven cleaning machines of the type that have been used, coating would not be effective. The importance of close attention to details is recognized. The leading coating manufacturers make a practice of having their own inspectors continually at the major projects where their material is being applied. In this way they can be sure that coating is prepared at the right temperature and that it is properly applied. Holiday detectors which are readily made by pipeline organizations enable inspectors to locate bare spots in the coating which are not visible to the eye. A satisfactory holiday detector can be made by using two batteries, of a type used in automobiles, connected with a high-tension coil which in turn is connected with a frame holding short wires against the pipe. When these wires pass over a bare spot on the pipe, attention of an inspector is called by a buzzing sound.

In laying the 26-in. natural-gas line, previously mentioned, an innovation was introduced which consisted of wrapping the pipe with wooden mats made of veneer strips impregnated with asphalt. The pipe was wrapped with these mats for sections of the ditch where the back fill contained rock or clods which might break through the kraft-paper wrapping and injure the enamel coating.

In the Gulf Coast area of the United States, cathodic protection is more extensively practiced than anywhere else. Wider use of inexpensive equipment can be observed. Current is furnished either by wind-driven generators or by power lines which transmit through rectifiers.

## Improved Methods

To serve construction men, a versatile tractor shovel has been developed which combines in one machine the usefulness of shovel, loader, scraper, bulldozer, angle dozer, trail builder, and backfiller.

A construction firm which introduced the rooter into pipe-line construction 2 years ago, during the laying of a line in Wyoming and Utah, has this year developed equipment known as a rock rooter which has proved to be successful in New Hampshire and Vermont where the Portland-Montreal line was laid. The rooter consists of equipment which provides for lowering and raising a prong which rips the ground ahead of the ditcher. The rooter is towed by a tractor. The so-called rock rooter is made on the same principal but instead of a single prong it has a double prong with reinforcing bars which enable it to bring to the surface any rock which it can reach. In addition to being towed by a tractor it may also be pushed by an angle dozer.

In the glaciated country of New Hampshire and Vermont where ditch for the Portland-Montreal line was dug across numerous moraines containing many large boulders, it was found that the rock rooter made it possible to reduce materially the use of blasting. In addition to bringing rocks to the surface with a rock rooter, the construction firm followed a policy of moving any rock

*(Continued on Page 260)*

*Trench hoes clearing large glacial boulders from creek bed in construction of 235-mile 12-in. pipe line from Portland, Me., to Montreal, Que. This is the first major international crude-oil pipe line on the North American continent*

*Maquinaria quitando grandes peñascos glaciales del lecho de un riachuelo en la construcción de la linea de tubería de 12 pulgadas, de 235 millas, de Portland, Me., E. U. A., a Montreal, Que., Canadá. Esta es la primera línea de tubería para petróleo crudo, de caracter internacional, en el Continente Norteamericano*

ción de estas vueltas, se observó que, aun cuando el equipo y los métodos modernos son más eficaces que hace una década, cuando se tendió la primera línea, la rapidez diaria de la construcción es muy similar. Los constructores dicen que esto se debe al hecho de que la rapidez en el movimiento del equipo pesado queda restringida cuando se dedica al manejo de tubería de diámetro grande, lo cual requiere atención especial para su protección en todas las etapas del trabajo.

Este año, la industria de las líneas de tubería ha adoptado mucho la práctica de aplicar soldadura maciza a las líneas de tubería de gran diámetro, lo mismo que a las de diámetros menores. La soldadura maxiza o sólida elimina el uso de acoplamientos y se hace generalmente sin la ayuda de anillos. La experiencia en la operación de líneas construidas según estos modernos métodos, durante estos dos últimos inviernos, ha sido muy satisfactoria.

## Protección de tubería

Las prácticas seguidas estos últimos años para cubrir, arrollar y dar protección catódica a las tuberías, continúan usándose con perfeccionamientos dictados por la experiencia. La prueba del tiempo enseña la importancia de limpiar bien la tubería antes de aplicarle la imprimación y capa. En efecto, se comprende ahora que si la industria no hubiera tenido máquinas limpiadoras accionadas a motor del tipo que se venido usando hasta ahora, la aplicación de la capa no habría sido efectiva. Se reconoce ahora la importancia de dar minuciosa atención a los detalles. Los principales fabricantes de material de recubrimiento siguen la práctica de mantener sus propios inspectores en los proyectos importantes donde se utiliza su propio material. De este modo, pueden estar seguros de que el recubrimiento se prepara a correcta temperatura y que se aplica en debida forma. Los detectores holiday, que pueden hacerse con facilidad por las organizaciones de líneas de tubería, habilitan a los inspectores para localizar los puntos descubiertos del revestimiento, que no son visibles a la simple vista. Un satisfactorio detector holiday puede hacerse usando dos baterías, iguales a las de un automóvil, conectadas con una bobina de alta tención, la cual, a su turno, se conecta con un marco que sujeta alambres cortos contra la tubería. Cuando estos alambres pasan por encima de un punto desnudo o descubierto de la tubería, se produce un zumbido, para advertir al inspector la presencia de la falta.

En el tendido de la línea de tubería de 26 pulgadas de gas natural, aludida arriba, se introdujo una innovación que consistió en envolver la tubería con tapetes de madera hechos de tiras de madera impregnadas de asfalto. La tubería fué envuelta con estos tapetes en secciones de la zanja donde la tierra para el terraplén contenía rocas o terrones duros que pudieran romper el papel kraft de envolver y dañar la capa de esmalte.

En la zona de la Costa del Golfo de los Etados Unidos de América, la protección catódica se practica más que en todo otro lugar. Se observa aquí el uso de equipo económico. La corriente es suministrada por generadores accionados por molinos de viento o por líneas de fuerza eléctrica que transmiten por medio de rectificadores.

## Métodos de construcción perfeccionados

Para el servicio de los constructores, se ha desarrollado una pala en tractor muy versátil, que combina, en una sola máquina, una trailla, un cargador, una pala, un empujador recto, un empujador en ángulo, un rompedor de sendero y un terraplenador.

Una firma constructora, que introdujo la desarraigadora en la construcción de línea de tubería hace dos años, durante el tendido de una línea en Wyoming y Utah, ha desarrollado este año un equipo que se llama desarraigadora de rocas, que ha dado buenos resultados en Nueva Hampshire y Vermont donde se tendió la línea de Portland a Montreal. Esta desarraigadora es una máquina que permite bajar y levantar una punta o uña que rompe o abre el piso adelante de la máquina zanjadora. La desarraigadora es tirada por un tractor. La llamada desarraigadora de rocas funciona sobre el mismo principio, pero en lugar de tener una sola punta, tiene dos con barras de refuerzo, lo cual le permite traer a la superficie cualquiera roca debajo de la cual puedan meterse sus puntas. Esta nueva máquine es tirada por un tractor y puede también ser empujada por un empujador en ángulo.

En el campo rocoso de Nueva Hampshire y Vermont donde se excavó zanja para el tendido de la línea de tubería de Portland a Montreal, pasando por numerosos lugares repletos de grandes rocas, se vió que la desarraigadora de rocas hizo posible reducir el uso de la voladura con dinamita. Además de levantar las rocas a la superficie, esta máquina se empleó también para mover las rocas lejos de la zanja, y bueno es advertir que muchas de ellas eran de un gran tamaño. La aplicación del principio de arado a las desarraigadoras es un verdadero progreso en el tendido de líneas de tubería y es posible que tenga mucha influencia en las prácticas de abrir zanjas. Este año se ha dado mucha atención al perfeccionamiento de métodos de soldar. Se han hecho experimentos en el campo, pero hasta ahora, estas nuevas ideas no han alterado las bases fundamentales de los procedimientos corrientes de soldar.

## Prácticas de seguridad

Al estudiar las causas de los accidentes durante la construcción de líneas de tubería, se observa que la soldadura y la conducción de ca-

*(Continue en Pagina 260)*

# WEATHERFORD

# MAKES A SCIENCE OF STAGE CEMENTING

## WEATHERFORD WALL CLEANING SCRATCHERS

**Wall Cleaning Scratchers**
**Spiral Casing Guides**
**Cement Retaining Baskets**
**Straight Casing Guides**

Weatherford Wall Cleaning Scratchers are most commonly used to remove the filter cake in preparation for a cement job. They leave the walls of the hole in a condition which encourages cement to bond firmly and they centralize the pipe for an even distribution of the mixture. Weatherford Scratchers are also widely used when running liner. They remove the filter cake from the oil bearing formation, promoting free, full production.

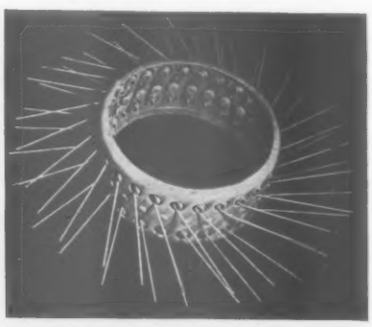
Weatherford Scratchers have completely exploded and dissipated all legends about the desirability of a filter cake in any well at any stage of the drilling operations. By dissipating the filter cake, they set up or restore normal capillary attraction beyond the bore of the well. Caving, sloughing, unequal distribution of the balance between earth and mud-column pressures, any tendency of pipe to stick, and other evils caused or tolerated by the old filter cake theory have been largely overcome by the practical application of Weatherford Wall Cleaning Scratchers. Stuck pipe, bad cement jobs and related troubles are greatly reduced.

Weatherford Scratchers have two rows of oil tempered bristles, spaced to ⅜″ centers, each anchored with a preformed pivot spring at the base, fully protected. In running the scratchers you get a rotating, reversing action. Their scratching and centering functions are never impaired, because the bristles do not strip and because ample provision is made for the slight wear on the bristle ends.

All sizes are available with bristles in any one of three lengths. MINIMUM bristles increase the diameter 3″ and make the scratcher suitable for use in tight-hole drilling, as for instance 5½″ in 6¾″ hole. STANDARD bristles increase the diameter 6″. EXTRA LONG bristles increase the diameter 8″ and should be specified when running small pipe in a large hole or for gravel packing jobs.

Scratchers are commonly anchored to the pipe by welding small lugs above and below, allowing for approximately 10″ of up-and-down travel. This floating movement keeps the pipe stripped clean. However the scratchers may be welded direct to the pipe. Scratchers should be spaced at a minimum of 16″ and a maximum of 10′.

We are the oldest manufacturer on record of wall scratchers now in use.



Patent Applied For

## RASPADORES WEATHERFORD PARA LIMPIAR LA PARED DEL POZO

Los raspadores Weatherford para limpiar la pared del pozo se usan ordinariamento para quitar la masa de filtro en preparación para un trabajo de cementación. Dejan las paredes del agujero en una condición que favorece le firme unión del cemento, y centralizan el tubo para una uniforme distribución de la mezcla. Los raspadores Weatherford se usan también mucho para introducir tubería. Quitan la masa de filtro de la formación petrolífera, promoviendo una producción expedita y completa.

Los raspadores Weatherford han disipado todas las leyendas acerca de la conveniencia de una masa de filtro en cualquier pozo a cualquiera etapa del trabajo de perforación. Quitando la masa de filtro, restablecen le atracción capilar normal. El derrumbe, la distribución desigual del equilibrio entre las presiones de la tierra y columna de lodo, la tendencia del tubo a paralizarse y otros peligros y males causados o tolerados por la antigua teoría de la masa de filtro, se han suprimido por la aplicación práctica de los raspadores Weatherford para limpiar la pared del pozo. El atascamiento del tubo, los trabajos de cementación ineficaces y otras molestias inherentes, se reducen mucho.

Los raspadores Weatherford tienen dos hileras de cerdas con temple en aceite, con ⅜″ entre centros, cada una sujeta con un resorte de pivote preformado en la base, completamente protegido. Al correr los raspadores, se obtiene una acción giratoria invertida. Sus funciones de raspadura y centración nunca se alteran a causa de que las cerdas no se desguarnecen y porque se ha hecho amplia provisión para el más leve desgaste en los extremos de las cerdas.

Se ofrecen en todos los tamaños con cerdas de tres largos. Las cercas MINIMAS aumentan el diámetro 3″ y hacen que el raspador se adapte al uso en perforación de agujero angosto, como por ejemplo 5½″ en agujero de 6¾″. Las cerdas NORMALES aumentan el diámetro 6″. Las cerdas EXTRA LARGAS aumentan el diámetro 8″ y deben usarse al meter tubo pequeño en agujero grande o para trabajos de emaquetadura con grava.

Los raspadores se sujetan generalmente al tubo soldando pequeños soportes arriba y abajo, permitiendo una carrera vertical de como 10″. Este movimiento flotante mantiene el tubo bien limpio. Sin embargo, los raspadores pueden soldarse directamente al tubo. Los raspadores deben quedar a una distancia mínima de 16″ y una máxima de 10 pies.

Somos los fabricantes más antiguos de raspadores de pared.

## WEATHERFORD CEMENT RETAINING BASKET

Patented

The Weatherford Cement Retaining Basket is a product of long experience.

It is made of a double cylinder of heavy canvas with breather slots at one end, enclosed with long highly flexible spring leaves spirally arranged between two collars. The double canvas cylinder is much greater in diameter than the collars, and the spring leaves have a natural bow.

After these baskets have been anchored to the liner or casing, the spiral springs are elongated and held in that position by a simple, positive latch. This eliminates any possibility of fouling the baskets when running the pipe. Once the liner or casing is in position, the baskets are unlatched by passing any tool through the pipe at that point. The spiral springs and canvas lining expand to form a tight trap at the top and bottom of the space to be cemented.

## CESTA DE RETENCION DE CEMENTO WEATHERFORD

La cesta de retención de cemento Weatherford es un producto de larga experiencia. Consta de un cilindro doble de lona gruesa con ranuras de respiración en un extremo, cubierto con láminas de muelle muy flexibles dispuestas en espiral entre dos collares. El cilindro doble de lona es mayor en diámetro que los collares y las láminas de resorte tienen una curva natural.

Después de anclar estascestas a la tubería, los resortes en espiral se alargan y se sujetan en esta posición por un pestillo sencillo y positivio. Esto suprime toda posibilidad de alterar las cestas durante la bajada de la tubería. Una vez que la tubería queda en posición, las cestas se sueltan pasando cualquiera herramienta por el tubo en ese punto. Los resortes en espiral y el material de lona se ensanchan formando una trampa apretada arriba y al fondo del espacio por cementarse.

## WEATHERFORD SPIRAL CASING GUIDE

Patented

The Weatherford Spiral Guide can be set at the time of installation for any maximum diameter up to 4½" in excess of the size of the pipe on which it is used.

The number, the rigidity and the spiral nature of the springs insure a centering action not always achieved by less efficient equipment.

The spiral spring blades trowel the walls of the hole, removing the filter cake and paving the way for a cement job proof against channeling and other common failures. In removing the filter cake the pressure of the mud column is automatically extended beyond the bore of the well, thus reducing trouble from gas strata.

## GUIA ESPIRAL DE TUBERIA WEATHERFORD

La guía espiral Weatherford puede colocarse al tiempo de la instalación para cualquier diámetro máximo hasta 4½" en exceso al tamaño de la tubería en que se usa.

Las láminas espirales de resorte cortan las paredes del agujero, quitando el material de filtro y preparando el camino para un trabajo de cementación a prueba de canalización y otras faltas. Al quitar el materil de filtro, la presión de la columna de lodo se extiende automaticamente más allá del diámetro del pozo, reduciéndose así toda irregularidad proveniente de la estrata de gas.

Patented

## WEATHERFORD STRAIGHT CASING GUIDES

The Weatherford Straight Casing Guides and Centralizers are welded throughout. The springs are made of the very best material for the purpose.

Straight guides up to and including 5" have five springs. Larger sizes have six springs.

All weatherford Guides are provided with a simple adjustment to govern the up-and-down travel of the floating collar and the overall expansion of the spring.

Three lengths are available. The LONG Guide has a maximum bow of 10" over the diameter of the pipe, making it suitable where small pipe is run in large holes or for gravel packing. The MEDIUM Guide has a maximum bow of 4½" greater than the diameter of the pipe, and is used for centralizing pipe in open hole formations. The SHORT Guide has a maximum bow of 3½", and is used for centering pipe where minimum cost is important and in tight-hole conditions.

## GUIAS RECTAS DE TUBERIA WEATHERFORD

Estas guías rectas de tubería Weatherford y centralizadores son de construcción soldada. Los resortes se hacen del mejor material para este fin.

Las guías rectas hasta de 5" tiene cinco resortes. Los tamaños más grandes tienen seis resortes.

Todas las guías Weatherford tienen un sencillo ajuste para gobernar la carrera vertical del collar flotante y la expansión total del resorte.

Se ofrecen en tres longitudes. La guía LARGA tiene un arco máximo de 10" sobre el diámetro de la tubería, resultando muy conveniente al tratarse de meter tubería pequeña en agujeros grandes o para empaquetadura de grava. La guía MEDIANA tiene un arco máximo de 4¼" mayor que el diámetro de la tubería y se usa para centrar la tubería en agujeros a descubierto. La guía CORTA tiene un arco máximo de 3½" y se usa para centrar tubería, en aquellos casos en que el costo mínimo es importante y en condiciones de agujero apretado.

# WEATHERFORD Spring Company

WEATHERFORD, TEXAS, U. S. A.

FRICK-REID SUPPLY CORPORATION jobs WEATHERFORD Wall Cleaning Scratchers east of the Rocky Mountains, through 75 field stores and 11 sales offices. Also exclusive export distributors.

**TODOS LOS PRODUCTOS WEATHERFORD SE VENDEN POR CUALQUIERA FIRMA DEL RAMO EN LA AMERICA**

away from the ditch which was as large as twice the size of an automobile. The application of the plow principle to rooters and rock rooters is an advance in pipe lining which may have a far-reaching influence on future ditching practices. This year considerable thought has been given to improvements in welding methods. There has been some experimenting in the field but so far these new ideas have not changed the fundamentals of familiar welding procedures.

## Safety Practices

In reviewing the causes of accidents during pipe-line construction it is observed that welding and tractor driving are not responsible for as many accidents as parts of the work which have an appearance of being less dangerous. The largest number of accidents occur where the walls of the ditch cave in. Many of these accidents can be prevented by careful supervision by foremen. When men are doing shoveling work in the ditch, which is known as "crumbing," foremen should see that the pipe is supported by a boom-tractor. Some construction men think this precaution is unnecessary but skids should not be relied upon entirely in situations of this kind.

Attention of foremen should also be directed to reducing burns occurring in the handling of coating and in working where new construction work is carried on close to a loaded line. With proper precautions repair work is being done successfully on loaded or "hot" lines of crude, gasoline and natural-gas systems.

## Pipe-Line Operation

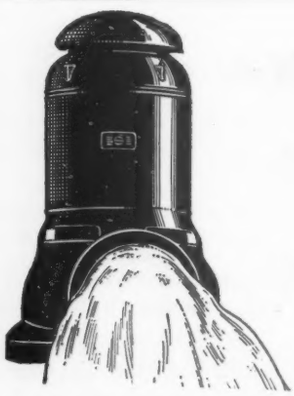
In the operation of both crude oil and gasoline pipe lines there has been a tendency toward the use of higher pressures. This trend will have an important effect on future practices which may be fundamentally different from those now followed. Normal operating pressures of 1,000 lb. can be anticipated with pressures at some points going as high as 2,000 lb. High pressures make it possible to increase the intervals between pump stations. In planning new projects it is now considered to be good policy to use pipe of larger diameter than the present demands of the traffic. When pumping stations are equipped to operate with a considerable range of horsepower and speed, flexibility of operation is provided which enables the system to function satisfactorily under a variety of conditions. In the design of a major crude-oil project, planned this year, spare pumping equipment for handling emergencies was reduced by providing for holding spare units at control points where they would be available for quick installation at stations in the area. The plan called for removing a unit from service while the spare

mione no son responsables por tantos accidentes como lo son otros detalles del trabajo que aparecen menos peligrosos a la simple vista. La mayor parte de los accidentes ocurren en los derrumbamientos de paredes de zanjas. Muchos de estos accidentes pueden evitarse por la cuidadosa vigilancia de los capataces. Cuando los obreros están usando la pala en la zanja, los capataces deben ver que la tubería quede soportada por el aguilón del tractor. Algunos constructores creen es innecesaria esta protección, pero conviene recordar que no conviene depender enteramente de patines en situaciones de esta clase.

Los capataces deben también prestar atención a la reducción de las quemaduras que ocurren en el manejo de la aplicación de capas o revestimientos o en aquellos casos en que la nueva construcción se hace cerca de una línea cargada. Con las debidas precauciones, el trabajo de reparación puede hacerse satisfactoriamente en líneas cargadas o "calientes" de sistemas de petróleo crudo, gasolina y gas natural.

## Operación de líneas de tubería

En la operación de líneas de tubería de petróleo crudo y de gasolina, se ha presentado la tendencia hacia el uso de mayores presiones. Esta tendencia tendrá un efecto importante en las prácticas futuras, que podrán ser fundamentalmente diferentes de aquellas que se siguen en la actualidad. Pueden anticiparse presiones de trabajo normales de 1000 libras, con algunas hasta de 2000 en ciertos puntos. Las presiones altas permiten aumentar los intervalos entre las estaciones de bombas. En la formulación de nuevos proyectos, se considera ahora como buen método usar tubería de mayor diámetro que el requerido por las exigencias del presente tráfico. Cuando las estaciones de bombas se equipan para funcionar con una considerable escala de fuerza motríz y velocidad, se establece así flexibilidad de trabajo, lo cual habilita al sistema para funcionar satisfactoriamente bajo una variedad de condiciones. En el estudio de un importante proyecto de petróleo crudo, emprendido este año, se redujo el equipo auxiliar de bombas para casos de emergencia, y esto se ha hecho sencillamente manteniendo las bombas de repuesto o emergencia en puntos centrales, enviándose de aquí a los lugares en que se necesiten. El método funciona de esta manera: el equipo de bomba de repuesto o emergencia se instala en lugar del equipo afectado, y permanece funcionando mientras este último se está reparando. Las bombas recomendadas para esta línea son centrífugas, accionadas por corriente eléctrica. En la construcción de la línea de petróleo crudo de Portland a Montreal, se sigue una práctica

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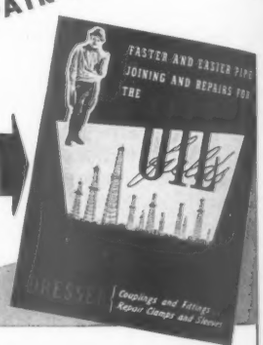


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unit was put in its place. Units planned for this line are electric-centrifugal. In building the Portland-Montreal crude-oil line, an unusual practice is followed in having reciprocating pumps driven by electric motors for all but three stations which are equipped with diesel-engine reciprocating-pump units. This line will handle a variety of crudes including those from South America, the Gulf Coast and inland fields in the United States.

With the increased flexibility provided by facilities capable of operating at higher pressures than are customary now, less storage will be required along truck-line systems to meet dispatching schedules. Attention is being given to methods for operating trunk-line systems from beginning to end as "closed systems." Synchronization of pumps at trunk pipe-line stations is accomplished satisfactorily on several lines.

With improvements introduced in pumping stations as the result of technical advances of various kinds, equipment at many of the older stations is being transformed so that stations are becoming gradually adapted to higher-pressure operation. Regard for the future requirements which pipe lines will be expected to meet is making it advisable to give these demands proper consideration when certain replace-

especial, expresada en el uso de bombas de movimiento alternativo accionadas por motores eléctricos, para todas las estaciones, con excepción de tres, las cuales están provistas de bombas de movimiento alternativo accionadas por motores Diésel. Esta línea transportará una variedad de petróleos crudos, incluyendo aquellos provenientes de la América del Sur, de la Costa del Golfo y de los yacimientos en el interior de los Estados Unidos de América. Con la mayor flexibilidad provista por facilidades que funcionan a mayores presiones que las corrientas al presente, se requerirá menos almacenamiento a lo largo de los sistemas principales, para responder a los programas de entrega. Se está dando atención a métodos para la operación de sistemas principales, desde el principio hasta el fin, como sistemas "cerrados". La sincronización de las bombas en las estaciones de la línea principal de tubería se ha realizado con éxito en varias líneas.

Con los refinamientos introducidas en las estaciones de bombas, como resultado de progresos técnicos de varias clases, el equipo de varias de las estaciones más antiguas se está transformando, de modo que las estaciones, en general, están gradualmente adaptando el trabajo a mayores presiones. El estudio de los futuros requisitos que tendrán que satis-


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| Diesel Engineering Handbook —MORRISON | $ 6.00 |
| Elements of Diesel Engineering —ADAMS | 4.00 |
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| Pipe Corrosion and Coating— LARSON | 1.50 |
| Piping Handbook—WALKER & CROCKEL | 6.00 |
| Done in Oil—LEVEN | 10.00 |

Extend your library of sound reading with any one or all of these books. They will be send c.o.d. if desired; otherwise, full payment should accompany your order.

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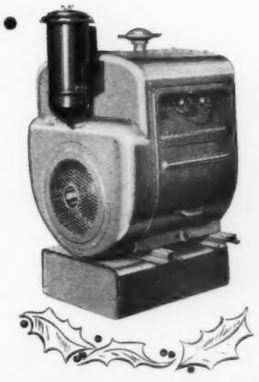
The Oil and Gas Journal
Tulsa, Oklahoma



## POWER.. *for GOOD*

Above all else, on this Christmas Day of 1941, it would be our wish that the mighty combined power of countless thousands of Heavy-Duty Air-Cooled Wisconsin Engines, at work for *Defense* and *Production* . . . in the Oil Fields . . . and in all branches of Industry . . . may help to re-establish Peace on Earth and Good Will Toward Men.



## FUERZA . . . BENEFICA

Sobre todo ahora, en este día de Pascuas de 1941, nuestro sincero deseo es que la enorme fuerza combinada de los millares de motores Wisconsin de enfriamiento por aire, de trabajo pesado, trabajando en Defensa y Producción . . . en los campos petrolíferos . . . y en todas las ramificaciones de la industria . . . sean de enorme ayude para establecer la paz en la tierra y la buena voluntad entre todos sus habitantes.

To which we add our sincerest Good Wishes for a joyous Holiday season and a Better New Year.

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ments are made in maintenance schedules. In some cases, instead of replacing a duplicate of the worn or damaged part, it is wise to make a number of changes which will render equipment adequate for modern and future conditions.

An important contribution to equipment used in systems operating at pressures higher than those which have been customary, is the ring joint with metal gasket and tongue and grove joints which recently have had wide application.

Experience with 2 years' operation of a line which was laid across a section of the Rocky Mountains has demonstrated the advantages of high-pressure service. This line traverses terrain at high altitudes. The line must operate through the winter months to move high viscosity oil at low temperatures. Pumping distances between stations are 100 to 200 miles. Pressures at which the line is operated vary from 1,100 lb. in the summer to 1,450 and even 1,600 lb. in the winter. A 27-mile 4-in. lateral has been operated under winter conditions at pressures between 1,650 and 2,000 lb. With an average of 1,850 lb. These high-pressure operations have been carried on without breaks and without trouble. Facilities were planned particularly for this type of service.

An 8-in. gasoline line in the Missouri Valley area operates normally at 1,000 lb. pressure where a single pump station moves fluid a distance of 171 miles. When operating at pressures between 1,000 and 1,200 lb. shipments of 16,000 to 17,000 bbl. of gasoline are moved daily.

One major company which was recently confronted with the necessity of expanding facilities to handle larger loads chose to revamp the station manifold and discharge piping at two of its smaller trunk-line stations in order to provide for operating at 1,000 lb. pressure. This program was regarded as preferable to building loops between stations 50 miles apart.

Operation at higher pressures will make it possible to use fewer pump stations with greater distances between stations of given capacities. This means that reserve capacity of a high-pressure system is in the pumping equipment rather than in pipe laid in the ground. Reserve capacity is needed for meeting temporary peak loads and for making up lost time due to shut downs. Flexibility obtained with higher pressures facilitates dispatching shipments and pumping grades of crude oil which have been considered too viscous to pump at pressures in the vicinity of 700 lb. In fact, crudes that now require heating may be pumped successfully at the higher pressures under discussion. With adequate modern equipment high pressures can be handled safely.

The conversion of conventional pump-station equipment to higher-pressure operation calls for a series of changes. In accordance with modern practice forged-steel cylinders adapted for high-pressure service are being supplied to serve as replacements for pumps formerly equipped with cast-iron cylinders.

Horsepower of diesel engines driving pumps can be increased by converting the engine from air to solid injection, by increasing the speed of the engine and by supercharging. In making these changes in a 500-hp. engine, 40 hp. will be gained by converting to solid injection; by increasing the speed from 225 to 227 r.p.m., 115 hp. will be added; supercharging will give another 327 hp. With a total of more than 980 hp. obtainable under improved operation, the capacity of the engine is nearly doubled.

facer las líneas de tubería, en el futuro, impone ahora la necesidad de dar debida consideración al tratarse de comprar o instalar ciertos equipos de repuesto. En ciertos casos, en lugar de renovar una pieza determinada, resulta más conveniente introducir ciertos cambios que impartirán al equipo la facultad de adaptarse a las condiciones presentes y futuras.

Una importante contribución al equipo usado en sistemas que trabajan a mayores presiones que las que han sido corrientes hasta ahora, es la unión anular con empaquetadura metálica y uniones de ranura y lengüeta, que han tenido amplia aplicación recientemente.

La experiencia de 2 años de funcionamiento de una línea de tubería tendida por una sección de las Rocky Mountains, ha demostrado las ventajas del servicio a alta presión. Esta línea atraviesa un terreno a grandes altitudes. La línea debe funcionar durante los meses del invierno, para transportar petróleo de gran viscosidad a bajas temperaturas. Las distancias entre las estaciones de bombas son de 100 a 200 millas. Las presiones a que funciona la línea varían de 1.100 en el verano a 1.450 y hasra 1.600 libras en el invierno. Una línea lateral de 4 pulgadas, de 27 millas, se ha operado bajo condiciones de invierno a presiones de 1.650 y 2.000 libras, con un promedio de 1.850 libras. Estas operaciones a alta presión se han llevado a cabo sin ninguna interrupción o dificultad. Las facilidades se proyectaron particularmente para este tipo de servicio.

Una línea de tubería de gasolina de 8 pulgadas en el valle de Missouri funciona normalmente a 1.000 libras de presión, contando con una sola estación de bombas que mueve el líquido a una distancia de 171 millas. Cuando funciona a presiones entre 1.000 y 1.200 libras, transmite por la línea de 16.000 a 17.000 barriles de gasolina al día.

Una importante compañía que en el envío confrontada recientemente con la necesidad de extender sus facilidades para el manejo de mayores cargas, decidió modernicar las tuberías en entrada y de salida de dos de sus estaciones más pequeñas en la línea principal, para establecer en estas estaciones una operación a 1.000 libras de presión. Este programa se consideró mucho mejor que construir tubería auxiliar entre estaciones a 50 millas de distancia.

La operación a mayores presiones permite usar menos estaciones de bombas, con mayor distancia entre las estaciones de capacidades dadas. Esto significa que la capacidad de reserva de un sistema de alta presión está en el equipo de bombas, más bien que en la línea de tubería tendida en el suelo. Se necesita la capacidad de reserva para responder a cargas máximas temporarias y para compensar el tiempo perdido debido a paralizaciones. La flexibilidad que se obtiene mediante las mayores presiones facilita la transmisión de petróleos, incluyendo aquellos que por su gran viscosidad se creía que no podrían transmitirse a presiones de 700 libras. En efecto, los petróleos crudos que requieren calentamiento, pueden transmitirse satisfactoriamente a las mayores presiones.

La conversión del equipo corriente de estación de bombas a funcionamiento a mayores presiones, requiere una serie de cambios. De acuerdo con la práctica moderna, se están suministrando cilindros de acero forjado, adaptados a servicio de alta presión, para suplantar a los de hierro fundido que se han empleado hasta ahora.

La fuerza de los motores diésel, que dan movimiento a las bombas, puede aumentarse mediante la conversión del motor de uno de inyección neumática a otro de inyección sólida o líquida, el aumento de velocidad del motor o el empleo de un sobrecargador. Al hacer estos cambios en un motor de 500 cdf., se ganarán 40 cdf. con la conversión de inyección de aire a inyección líquida; aumentando la velocidad de 225 a 227 rpm. se agregarán 115 cdf. y con la instalación de un sobrecargador, la fuerza se aumentará en otros 327 cdf. Con un total de más de 980 cdf. obtenible bajo condiciones mejoradas, la capacidad del motor queda aumentada casi al doble.

Varios métodos se han desarrollado para producir más fuerza motríz cargando los cilindros a presiones superiores a la atmosférica. Se ha dado especial atención este año a los resultados obtenidos con un sistema que consiste en un ventilador centrífugo montado en el mismo árbol con una turbina simple movida por los gases de escape del motor. La turbina y el ventilador o soplador están montados en la misma caja con un sistema de cierre de laberinto para impedir el escape de un compartimiento al otro. La presión principal sobre los gases de escape adelante de la turbina es general-

*Auxiliary building at pump station on Pan American Pipe Line Co. system between East Texas and the Gulf Coast. The auxiliary building contains an internal-combustion engine, run on butane fuel, direct connected to an electric generator, fuller's earth lubricating-oil reclaimer equipped with heating element, centrifuge which purifies crude oil used as fuel, sump pump, and air compressor, all potential fire hazards*

*Edificio auxiliar en la estación de bombas del sistema de la Pan American Pipe Line Co. entre East Texas y la Costa del Golfo. El edifició auxiliar contiene un motor de combustión interna accionado con combustible de butano, conectado directamente a un generador eléctrico, filtro de galactita para depurar el aceite lubricante, provisto de calefactor, centrifuga que purifica el petróleo crudo usado como combustible, bomba de desague y compresor de aire, todos posibles riesgos de incendio*

OIL ... JOURNAL EDITION

# BAASH ROSS News

BAASH-ROSS TOOL COMPANY • LOS ANGELES • HOUSTON • NEW YORK

UN BOLETIN RELATIVO A NOTICIAS SOBRE EQUIPO Y TRABAJOS EN LA INDUSTRIA DEL PETROLEO

# LA INDUSTRIA PETROLERA DA APROBACION A LOS KELLY HEXAGONALES

## En un Ano Crece al Doble la Demanda

**Probablemente no hay hoy día otra industria que ponga más atención a la compra de equipo que la petrolera. En los trabajos de perforación actuales, se llevan cuentas exactas de los gastos de trabajo de cada máquina o equipo. Se observan atentamente los gastos de conservación, el rendimiento efectivo, la duración . . . con el resultado de que el dueño sabe *exactment* lo que le cuesta cada parte de su equipo por hora de trabajo o por pie de agujero, después de haber trabajado algún tiempo.**

*No hay argumentos contra semejante evidencia.* Por está razón, cuando entre las importantes empresas existe creciente tendencia hacia el uso de cierto tipo de equipo, se puede entonces estar seguro de que el equipo del caso está dando mejores resultados que los similares.

Y el progreso de las ventas del kelly hexagonal de Baash-Ross muestra definitivamente que la creciente tendencia en la industria es hacia el kelly hexagonal de Baash-Ross para *todo* trabajo de perforación . . . una tendencia tan elocuente que *el año pasado solamente* la demanda por estos kelly aumentó 2¼ *veces* el total del año anterior.

Esto, en adición al hecho de que la demanda del kelly hexagonal de Baash-Ross ha aumentado continuamente desde el año en que se introdujo a la industria, es confirmación absoluta de que esta herramienta es la mejor del mercado, desde todo punto de vista: costo basado sobre funcionamiento, duración y rendimiento en general.

He aquí los rasgos de kelly que necesitan las empresas—*y que los están obteniendo en los kelly hexagonales.*

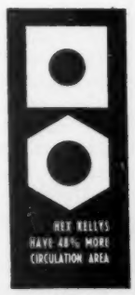
*Hex Kellys tienen 23% mas de resistancia curvadura*

▶LOS DUEÑOS QUIEREN UN KELLY QUE PERMANEZCA RECTO POR MAS TIEMPO. Los operarios nos dicen que una de sus principales dificultades con los kelly está en conservarlos rectos. Generalmente, los kelly se doblan cuando se meten en el agujero de ratón . . . o través de soporte inadecuado mientras se mueven. En todo caso, los *kelly hexagonales son 23.2% más resistentes a estas tensiones de dobladura . . . y permanecen rectos por más tiempo, bajo condiciones de trabajo más severas que los kelly cuadrados de tamaños comparables.*

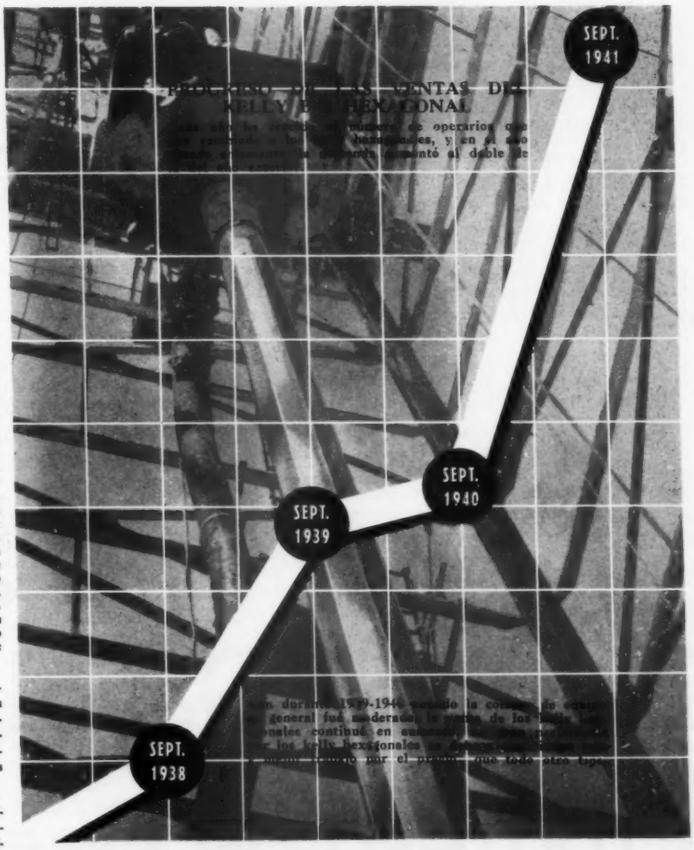
Una vez que haya probado los kelly hexagonales, verá, como lo han hecho otros, que la mayor duración, el menor costo de conservación, y la mayor rigidez que ofrecen son ventajas suficientes para justificar un cambio completo a los kelly hexagonales para todos sus requisitos de perforación.

▶LOS OPERARIOS QUIEREN FUNCIONAMIENTO SUAVE A TODAS LAS VELOCIDADES DE PERFORACION. En la moderna perforación a altas velocidades, el equilibrio es un factor importante en el kelly. Debido a que los kelly hexagonales se labran a máquina de aleación especial de acero, tienen menores tolerancias que los kelly cuadrados de construcción *forjada*. Agregando a esto su exacto diámetro concéntrico y exacta alineación de unión, el resultado es casi perfecta distribución de peso es decir, un kelly mejor equilibrado, para perforación más suave a todas las velocidades de perforación. Estos rasgos son importantes al recordar que las altas velocidades rotativas dehoy día podrán aumentarse más aún en el futuro.

▶LOS OPERARIOS QUIEREN MAXIMO FLUJO DE LIQUIDO POR LA CADENA DE TUBOS. ¿Para qué sirven las bombas de gran rendimiento y el tubo de perforación de agujero completo, si la circulación se tapa o limita en el kelly, en el punto donde entra a la tubería? Además de mayor firmeza, los kelly hexagonales tienen 48%* más superficie de circulación que los cuadrados de tamaño comparable—una ventaja verdaderamente valiosa.




*Hex Kellys tienen mas de area de circulación*



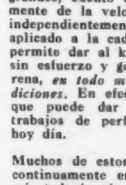

▶LOS OPERARIOS QUIEREN MAYOR FIRMEZA TORSIONAL. Como el esfuerzo de girar la completa cadena de perforación se concentra en el kelly, su facultad para transmitir esfuerzo de rotación es de tremenda importancia. Debido a su forma y mayor superficie transversal, el kelly hexagonal *es 28,6% más poderoso en esfuerzo de rotación, que el kelly cuadrado de tamaño comparable.*

▶LOS OPERARIOS QUIEREN MAXIMA RESISTENCIA DE TENSION. Además de hacer girar la cadena de perforación, el kelly tiene también que *soportarla* . . . y aquí otra vez el kelly hexagonal *es 1,8% más fuerte que el kelly cuadrado de tamaño comparable.*

▶LOS OPERARIOS QUIEREN ADAPTABILIDAD MAXIMA. En las variables aplicaciones de hoy día, el kelly hexagonal es muy superior al kelly cuadrado, pues puede usarse bajo todas las condiciones de perforación—*corrientes y bajo presión*—sin ningún cambio. Con un kelly hexagonal, se queda listo para todo trabajo, en cualquier momento.

Antes de invertir en cualquier equipo de kelly, averigue lo poco que cuesta y lo mucho que conviene usar los kelly hexagonales de Baash-Ross. El representante de la Baash-Ross le dará a Vd. información completa . . . o bien podrá Vd. pedirla directamente de nosotros.

## PARA PERFORACION DE RENDIMIENTO MAXIMO



No hay una combinación más eficaz para la rotación de una cadena de perforación que un Kelly "Trubore" Baash-Ross girando *en buje de Kelly rodillos Baash-Ross de tipo 2R.*

En lugar de tener las superficies *planas* de propulsión ordinarias que se aprietan contra el kelly a medida que se aumenta la presión propulsora, este buje tiene *rodillos* grandes, exento de rozamiento. Independientemente de la velocidad de la perforación . . . independientemente del esfuerzo de rotación aplicado a la cadena de perforación, este buje permite dar al kelly una alimentación suave y sin esfuerzo y gobierno de precisión a la barrena, *en todo momento y bajo todas las condiciones.* En efecto, es el único tipo de buje que puede dar rendimiento máximo en los trabajos de perforación de alta velocidad de hoy día.

Muchos de estos bujes han estado trabajando continuamente en 180.000 pies de agujero, y más todavía, sin conservación, salvo lubricación periódica aplicada con pistola engrasadora . . . lo cual indica el gran servicio exento de molestia que pueden dar.

Se ofrecen en dos tipos—el tipo 2RS para kelly cuadrado y el tipo 2RH para kelly hexagonal. Pídanos información completa sobre su ventajoso funcionamiento.

*Estas cifras se basan sobre el kelly cuadrado de 6" con diámetro interior de 3½", en comparación con el kelly hexagonal de 6⅝" con diámetro interior de 4½". A causa de que es la dimensión máxima lo que gobierna la selección de un tamaño de kelly, el hexagonal de 6⅝" (dimensión de esquina transversal de 7⅛") es comparable—y en efecto, es ¼" menor—en su dimensión de limitación, que el kelly cuadrado (dimensión de esquina transversal de 7⅜"). En otros tamaños comparativos, el kelly hexagonal ofrece ventajas proporcionales.

Several methods have been developed for producing more horsepower by charging the cylinders of an engine at pressures above atmospheric. Special attention has been directed this year to results obtained with a system which consists of a centrifugal air blower which is mounted on the same shaft with a single-impulse turbine driven by the exhaust gas of the engine. The turbine and blower are mounted in the same case or housing with a system of labyrinth seals to prevent leakage from one compartment to another. The main pressure on the exhaust gases ahead of the turbine is generally 2 to 3 lb. above atmosphere. The charging air from the blower is 3 to 4 lb. above atmospheric pressure.

Extra-wide exhaust and intake cams are provided so that both exhaust and intake valves are open simultaneously, giving an overlap of 120 crank-angle degrees.

### Large-Diameter Pipe

In the course of experience with this equipment it was found that where a much larger machine was used on the latest installation, the full load speed of the turbocharger could be reduced from 20,000 to 12,000 r.p.m. Three improvements have been recommended in order to obtain maximum success. A proper method of manifolding should prevent overlapping of exhaust from different cylinders. Regulation of air at low loads should insure proper combustion. The equipment should be designed so that it can be installed in different positions in order to simplify piping.

A practice which has been responsible for making important savings in recent years is the systematic substitution of larger modern lines for obsolete small-diameter, screw pipe. It has been pointed out that modern coated lines of sizes between 12 to 16 in. can profitable replace older lines of 6, 8 and 10-in. pipe which are frequently laid parallel. One large-diameter modern line can be operated more economically than several obsolete small-diameter lines of equivalent capacity.

*Boom tractor carrying section of 20-in. pipe in the laying of two lines of this size across a stream in Kansas during the construction of a project for Natural Gas Pipeline Co. of America which calls for the laying of more than 400 miles of 26-in. pipe to loop the company's trunk line from the gas fields of the Texas Panhandle to Chicago, Ill.*

*Tractor de aguilón transportando una sección de tubería de 20 pulgadas en el tendido de dos líneas de este tamaño a través de un riachuelo en Kansas durante la construcción de un proyecto de la Natural Gas Pipeline Co. of America, el cual comprende la instalación de más de 400 millas de tubería de 26 pulgadas para conectar la línea principal de la compañía de los campos gasíferos del Texas Panhandle a Chicago, Ill.*

Se proveen levas extra grandes para el escape y admisión, para que tanto las válvulas de escape como las de admisión se abran simultaneamente, dando un efecto de 120 grados de ángulo de cigüeñal.

En el curso de la experiencia con este equipo se ha visto que donde se ha usado una máquina más grande en la más reciente instalación, la velocidad de la carga completa del turbocargador podría reducirse de 20.000 a 12.000 rpm. Tres innovaciones se han recomendado para obtener un éxito máximo. Un adecuado método de múltiples podría evitar la superposición del escape de diferentes cilindros. La regulación del aire a cargas bajas podría asegurar debida combustión. El equipo debe proyectarse de modo que pueda instalarse en diferentes posiciones, para simplificar la tubería.

Una práctica que ha sido responsable por importantes economías en años recientes es la substitución sistemática de la tubería roscada de diámetro pequeño, por la tubería más grande. Se ha visto que las modernas líneas recubiertas de tamaños de 12 a 16 pulgadas pueden reemplazar ventajosamente a las líneas antiguas de 6, 8 y 10 pulgadas, que a menudo se tienden paralelas. Una línea de tubería moderna, de diámetro grande, puede operarse más economicamente que varias líneas de diámetro pequeño de capacidad equivalente.

Al estudiar la propuesta línea de tubería de petróleo crudo de Texas a la costa del este, la atención de la industria se ha dirigido al bajo costo de transporte que es posible con una línea construída de acuerdo con la práctica moderna, particularmente al tratarse de una tubería de gran diámetro. Los contínuos refinamientos en los métodos de construcción de líneas de tubería hacen ahora factible la instalación de líneas de tubería que pueden explotarse lucrativamente en zonas que hasta ahora han carecido de este eficaz medio de transporte.

# Natural Gasoline Progress

# Progreso de Gasolina Natural

DEVELOPMENTS in the natural-gasoline industry this year center largely around the adoption of equipment and operations for recovering hydrocarbon fractions normally considered secondary products in the manufacture of the various grades of natural gasoline. This development was caused primarily by the unprecedented demand for high-octane blending stocks used in the manufacture of 100-octane aviation gasoline. In plants where it was economically feasible, therefore, facilities for recovering these fractions were installed in order to realize additional operating revenues.

On the whole, the total amount of new-plant building and plant-enlargement work undertaken was the smallest in any recent year. In the forepart of the year, the lull in new construction activities was chiefly due to the abnormally low product prices that prevailed over the previous year. During the period of these low prices there was little incentive for large companies to build new plants when many of their units were not operating at a profit. Enlargement work, as well as remodeling, likewise was kept at a minimum for the same reason. Few discoveries of large oil fields during recent months also was instrumental in reducing new-plant construction.

Another factor tending to discourage construction work was the difficulty in obtaining materials for new plants. The shortage of materials as yet has not exerted too heavy an influence on plant building, but

LOS desarrollos en la industria de la gasolina natural este año se focusan principalmente en la adaptacion de equipo y procedimientos para la recuperación de las fracciones de hidrocarburo que normalmente se consideran productos secundarios en la manufactura de las varias clases de gasolina natural. Este desarrollo se ha debido principalmente a la demanda sin precedente de materiales de mezcla de alto número octano, usados en la manufactura de gasolina de aviación de número octano 100. En las refinerías en que esto es factible, se han instalado, por lo tanto, facilidades para la recuperación de estas fracciones, a fin de obtener adicionales ingresos.

En general, la cantidad total de construcción de nuevas refinerías y ensanchamiento de refinerías existentes, que se ha llevado a cabo, ha sido el menor que se registra estos últimos años. A principios de año, la lentitud en actividades de nuevas construcciones se debío principalmente a los precios anormalmente bajo de los productos, en comparación con los del año anterior. Durante el período de estos precios bajos, hubo poco incentivo para que las grandes compañías construyeran nuevas instalaciones, dado que muchas de las existentes no estaban trabajando entonces con ganancias. El trabajo de expansion, lo mismo que las obras de reforma, se mantuvieron a un mínimo por la misma razón. Los pocos descubrimientos de grandes yacimientos de

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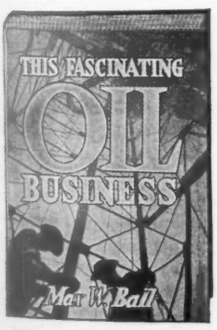
# This Fascinating Oil Business

*By Max W. Ball*

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in several instances completion of plants has been delayed for several months due to inability to obtain certain equipment. From present indications, it is probable that difficulty in securing equipment may be a heavier depressent on new-plant work.

## Trends in Plants

In reviewing aspects of the natural-gasoline industry, a discussion of the trend in number of plants and in capacities is in order. The number of plants in the United States in 1941 continued to decline, in continuation of the downward trend started in 1929. This year's survey by The Oil and Gas Journal showed there were 609 plants in the nation, of which all but 30 were in operation. In so far as plant capacities are concerned, the survey revealed the upward trend in total throughput was checked, there being an 85,000-gal. drop to 11,275,000 gal. daily capacity. The decline in number of plants outstripped the drop in plant capacity, however, so that the average-size plant has increased slightly in capacity to 18,500 gal. daily.

The decrease in capacity was credited largely to low prices in 1940 for natural gasoline. These marginal prices offered no incentive for construction of plants in new fields or enlargement of those already in operation. Also, the low prices caused many plants to become uneconomical in their operations, resulting in their abandonment.

In regard to facilities for producing liquefied petroleum gas, the natural-gasoline industry has raised its combined daily capacity to about 2,000,000 gal. This capacity is distributed among 166 of the industry's plants, nearly all of which had relatively large capacity for producing regular grades of natural gasoline. Thus the industry has enlarged its facilities for manufacturing butanes and propanes until its capacity for these liquefied hydrocarbons is about 18 per cent as large as its capacity for producing natural gasoline.

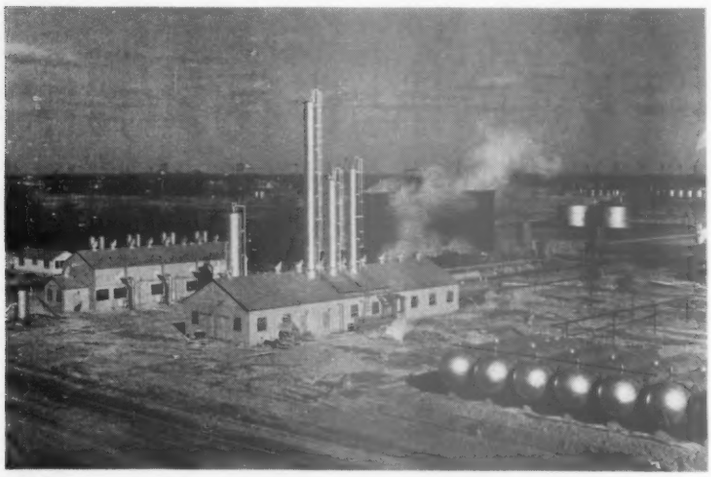
## Closer Fractionation Required

Several years ago butane and propane, or a butane-propane mixture, were the only lighter hydrocarbon fractions isolated from regular grades of natural gasoline. Manufacture of these products grew rapidly and the output was steadily absorbed in the liquefied-petroleum-gas markets. The rapidly growing demand for high-octane aviation and motor fuels, however, is tending to change this pattern, for now in plants where it is economically possible the isobutane and isopentane fractions are being isolated. In the past the isobutane fraction was not removed from the butane-propane mixture in plants producing low-vapor-pressure gasolines.

The value of these isomeric compounds in producing aviation fuels lies in the fact that they have higher antiknock values than their normal correlatives, as well as greater susceptibility to lead treatment. Isobutane, however, due to its volatility is limited as a component in fuels for internal-combustion engines. Thus its greatest potential value lies in its availability for feed stock to an alkylation unit in which it is coupled with butylenes to form valuable alkylate.

These isomers occur in relatively small quantities in practically all natural gas. Therefore, the role that the natural-gasoline industry may serve in supplying the demand for high-octane aviation fuels is that of producing large quantities of relatively pure isobutane or isopentane. Although isopentane is an integral and desirable part of natural gasoline, it is not being isolated as extensively as isobutane. Also, it is now commercially practicable to convert normal butane to isobutane by isomerization. The natural-gasoline industry, with its large production of this relatively cheap product, therefore, will further aid in supplying the demand for high-octane fuels.

In producing isobutane, much



*General view of Illinois plant. Pressure storage tanks in the right foreground are standard equipment at all modern plants.*

*Vista general de una instalación en Illinois. Los tanques de almacenamiento de presión, a la derecha, son equipo normal de las refinerías modernas.*

petróleo durante los mesas recientes fué también un causa en la reducción de la construcción de nuevas instalaciones.

Otro factor que tendió a desanimar el trabajo de construcción fué la dificultad en obtener materiales para las nuevas instalaciones. La escasex de materiales no ha ejercido todavía demasiada influencia en la construcción de instalaciones, pero en varios casos, la terminación de refinerías ha sido retardada por varios meses a causa de la imposibilidad de obtener ciertos equipos. Según las indicaciones presentes, es probable que la dificultad en obtener equipo será un obtáculo más serio que nunca en la construcción de nuevas instalaciones.

## Tendencias en las instalaciones

Al estudiar los varios aspectos de la industria de la gasolina natural, es necesario referirse a la tendencia en número de instalaciones y sus capacidades respectivas. El número de refinerías en los Estados Unidos de América en 1941 continuó bajando, siguiendo la tendencia a reducción comenzada en 1929. El estudio de este año, emprendido por The Oil and Gas Journal, mostró que había en todo el país un total de 609 instalaciones, todas trabajando, con excepción de 30. En lo que concierne a la capacidad de estos establecimientos, el estudio descubrió que había cesado la tendencia hacia creciente producción observándose un decaimiento de 85.000 galones, quedando ahora fijanda en más o menos 11.275.000 de galones la capacidad diaria. La declinación en número de establecimientos sobrepasó al descenso en capacidad, de modo que la capacidad de las refinerías de tamaño promedio ha crecido levemente a 18.500 galones al día.

La reducción en capacidad se debe, según se dice, a los precios bajos que predominaron en 1940 para la gasolina natural. Estos precios bajos no ofrecieron incentivo a las construcción de instalaciones en nuevos campos o a la expansión de los establecimientos ya en operación. Por otra parte, los precios bajos hicieron que muchas instalaciones o refinerías no pudieran funcionar lucrativamente, lo cual resultó en su paralización o abandono.

Acerca de facilidades para la producción de gas de petróleo liquificado, la industria de la gasolina natural ha aumentado su capacidad diaria combinada a cerca de 2.000.000 de galones. Esta capacidad queda distribuida entre cerca de 166 establecimientos de la industria, y casi todos ellos tienen capacidad relativamente grande para producir las clases ordinarias de gasolina natural. La industria ha, por lo tanto, aumentado sus facilidades para la manufactura de butanos y propanos, hasta que su capacidad para estos hidrocarburos líquidos es cerca de 18 por ciento de su capacidad para producir gasolina natural.

## Se requiere fraccionación mas fina

Hace varios años, el butano y el propano, o la mezcla de butano y propano, eran las únicas fracciones más volátiles de hidrocarburo que se separaban o aislaban de las clases ordinarias de gasolina natural. La manufactura de estos productos creció con rapidez y el rendimiento fué continuamente absorbido en los mercados del gas de petróleo líquido. La creciente demanda de combustibles de aviación y de motor de alto número octano tiene, sin embargo, la tendencia hacia cambiar esta situación, pues ahora, en las instalaciones donde es economicamente posible, las fracciones de isobutano y isopentano se están aislando también. En el pasado, la fracción de isobutano no se extraía de la mezcla de butano y propano en las refinerías que producían gasolinas a baja presión de vapor.

El valor de estos materiales isoméricos, en la producción de combustibles de aviación, reside en el hecho de que tienen una mayor importancia en propriedades antidetonantes, lo mismo que mejor susceptibilidad al tratamiento con plomo. El isobutano, sin embargo, debido a su volatilidad, es limitado, como componente en combustibles para motores de explosión interna. Por esta razón, su mayor valor potencial está en su utilización como material de alimentación de una instalación de alcalización, en la cual se junta con los butilenos para formar alquilatos.

Estos isoméricos ocurren en cantidades relativamente pequeñas en casi todo gas natural. Por esta razón, el papel que la industria de la gasolina natural puede desempeñar en suministrar la demanda de combustibles de aviación de alto número octano es producir grandes cantidades de isobutano de isopentano relativamente puro. A pesar de que el isopentano es una parte integrante y conveniente de la gasolina natural, no se le está aislando tanto como el isobutano. Por otra parte, es ahora comercialmente práctico convertir el butano normal en isobutano por isomerización. La industria de la gasolina natural, con su gran producción de este producto relativamente barato, podrá así ayudar más aún a satisfacer la creciente demanda de combustibles de alto número octano.

En la producción de isobutano, se requiere un equipo más costoso y un control más exacto que los que se incluyen en la fraccionación simple para aislar el butano y propano. En el procedimiento de alcalización, el butano normal no tiene efecto en la reacción de la alcalización, pero su presenciam en cantidades apreciables, es inconveniente a causa de que aumenta el tamaño del equipo necesario para producir una cantidad dada de alquilato. El fabricante de gasolina natural se ve, por la tanto, al frente del problema de producir un isopropano tan puro como sea posible hacerlo de una manera económica.

Una idea del rígido control de la

Oil and Gas JOURNAL EDITION

# BAASH-ROSS News

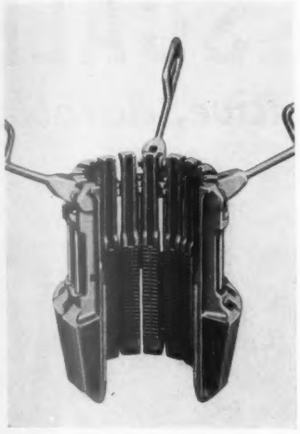
BAASH-ROSS TOOL COMPANY • LOS ANGELES • HOUSTON • NEW YORK

UN BOLETIN RELATIVO A NOTICIAS SOBRE EQUIPO Y TRABAJOS EN LA INDUSTRIA DEL PETROLEO

# LOS MAS RECIENTES DESARROLLOS EN SEGURIDAD PARA EVITAR COSTOSOS TRABAJOS DE SALVAMENTO

## Las Cunas de Nuevo Tipo se Arrollan Alrededor del Tubo Compensan Automaticamente el Desgaste

**Los petroleros de experiencia saben que uno de los trabajos más peligrosos que se hacen en el aparejo de perforación es el de soportar una cadena de collares de perforación lisos en la plataforma de la rotativa mientras se forma o separa una cadena de perforación.**

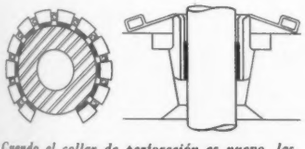


NUEVAS CUÑAS BAASH-ROSS PARA COLLAR DE PERFORACION—*Ilustramos aquí el tipo largo "C. S. Long" con extensiones para proveer asiento a la abrazadera de seguridad (vea la columna 3). El tipo regular "C. S. Regular" es similar, pero no tiene extensiones arriba de la superficie de sujeción.*

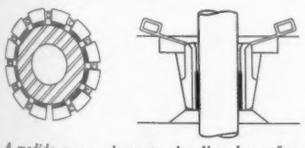
El inconveniente ofrecido por las cuñas corrientes es que, a medida que se desgastan los collares de perforación, por la acción de rozamiento con la pared del agujero, los segmentos de la cuña no pueden compensar el diámetro reducido de los collares. A medida que se reduce el diámetro, menor será la superficie de cuña en contacto con el collar, y finalmente las cuñas dejarán de sujetar y la cadena de tubería caerá por el agujero.

Baash-Ross atacó el problema y finalmente desarrolló una cuña especial para collar de perforación, que funciona correctamente. Los segmentos de la cuña son angostos y todos van montados juntos en un eslabón flexible, el cual permite arrollarlos alrededor del collar como unas tenazas de cadena. A medida que se desagasta el collar de perforación y su diámetro se reduce, la cuña de collar Baash-Ross se ajusta automaticamente dando el mismo contacto completo que existía cuando el collar estaba nuevo. En efecto, hasta un cambio de 1½" en el diámetro del tubo (casi 5" en medida de circunferencia) no afectará el efecto de sujeción de esta nueva herramienta Baash-Ross.

Pídanos ejemplar de nuestro Boletín 13 en que describimos este sobresaliente desarrollo en seguridad.



*Cuando el collar de perforación es nuevo, las cuñas flexibles descansan más arriba en la parte cónica, dando una sujeción completa.*



*A medida que se desgasta el collar, las cuñas descansan más abajo en la parte cónica, dando siempre la misma sujeción completa.*

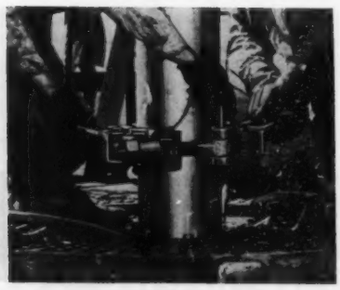
CUÑAS ORDINARIAS

*Con collares nuevos dan adecuado sujeción*

*Con collares desgastados pierden gradualmente la sujeción*

• Las cuñas Baash-Ross para collares de perforación se ofrecen en dos tipos: el "regular" y el "largo". El tipo "largo" se proyecta especialmente para usarse con la abrazadera de seguridad Baash-Ross, para establecer doble seguridad bajo todas las condiciones de trabajo. Este tipo tiene una extensión arriba de los segmentos de la cuña, para proveer un asiento a la abrazadera de seguridad. Tanto el tipo "regular" como el tipo "largo" tienen forros renovables para asegurar máximo rendimiento efectivo en todo momento, con gastos de conservación mínimos.

Un juego de cuñas Baash-Ross para collar de perforación y una abrazadera de seguridad Baash-Ross representan una de las mejores inversiones en seguridad que existen para la protección del pozo contra costosos trabajos de terminación . . . y *es una inversión que durará muchos años.* El representante de la Baash-Ross más cercano gustosamente le suministrará información completa.



## UNA ABRAZADERA DE SEGURIDAD DE MULTIPLE SUJECION PARA EQUIPO DE JUNTA PLANA

He aquí una nueva herramienta que todo aparejo de perforación debería tener siempre—*la abrazadera de seguridad Baash-Ross.* Es una herramienta que permite manejar tubería de junta plana, collares de perforación lisos y otro equipo de superficies planas, con completa seguridad en todo instante. Se arrolla alrededor del tubo con facilidad y rapidez, y sólo una pocas vueltas de llave tubular se requieren para afirmarla en su sitio.

Una vez aplicada, sujeta las cargas más pesadas sin resbalar o ceder, a causa de que cada eslabón individual tiene un miembro de sujeción individual *separado* que se ajusta automaticamente a la carga. Los miembros de sujeción son, en realidad, pequeñas cuñas cónicas dispuestas en los cuerpos de los eslabones. Cuando la abrazadera se aprieta, estas cuñas dan una firme sujeción inicial al tubo. A medida que aumenta la carga—o en caso de ocurrir una carga mayor súbita—las cuñas cónicas ejercen mayor apriето todavía contra la superficie del tubo, estableciendo una sujeción que no puede fallar. Sin embargo, tan pronto como la abrazadera se suelta con la llave tubular, las cuñas se sueltan también inmediatamente, permitiendo quitar con facilidad la abrazadera.

Es importante observar que la abrazadera, por ser flexible, asegura una sujeción firme en toda superficie de tubo, ya esté ovalada o no. Y por dar una sujeción uniforme en *todos los puntos* no puede aplastar el tubo de pared delgada bajo las cargas pesadas.

Pídanos en seguida ejemplar del Boletín Baash-Ross No. 6-C en que describimos detalladamente esta económica abrazadera de seguridad.

Se pueden agregar o quitar eslabones, con toda facilidad, en el mismo aparejo, de modo que la abrazadera puede adaptarse a cualquier tamaño de tubo, desde 3¾" de diámetro hasta el que se quiera. Se suministra una caja de acero para guardar los eslabones adicionales, lo mismo que la abrazadera y la llave, cuando no se usan.

UNAS POCAS DE LAS MUCHAS HERRAMIENTAS
**BAASH-ROSS**
DE FINA CALIDAD PARA PETROLEO

- COLLARES FORJADOS "TRUBORE" PARA SONDAS del SISTEMA ROTATIVO
  En una aplia escala de formas
- KELLYS FORJADOS "TRUBORE" RECALCADOS
  Cuadrados, hexagonales, octagonales
- BUJE DE PROPULSION DE KELLY DE RODILLO
  Para kelly cuadrado y hexagonal
- CUÑAS ROTATIVAS DE ALINEACION AUTOMATICA
  Se ajustan automaticamente para agarro al largo completo
- CUÑAS ROTATIVAS, "TIPO CU"
  Unificadas para agarro máximo
- CABECEROS DE TUBO Y FIJACION
  En ambos tipos soldado y de suspensión por cuñas
- CABECEROS DE TUBERIA Y CUERPOS
  Las unidades intercambiables simplifican el inventario en el campo
- HERRAMIENTAS DE SALVAMENTO O PESCA PARA TODO FIN

. . . y muchos otros productos sobresalientes.

Pida ejemplar del catálogo BAASH-ROSS

### PUEDE USARSE CON CUÑAS DE COLLAR DE PERFORACION

El uso de esta abrazadera con las cuñas Baash-Ross para collar de perforación se describe a la izquierda. Este método da *doble* protección contra la caida de los collares de perforación por la plataforma de la rotativa, por muy desgastados o deformados que estén.

Por otra parte, cuando se presenta la necesidad de un elevador, esta abrazadera resulta ideal. En un reciente trabajo de salvamentó, levantó, por ejemplo, una cadena de *casi 1000 pies de tubería de 4½"*, más *cinco* collares de perforación de 7⅛".

more expensive equipment and accurate control of operations is required than in the simple fractionation step necessary to isolate butane and propane. In the alkylation process the normal butane has no effect on the alkylation reaction, but its presence in appreciable quantities is objectionable in that it increases the size of the equipment necessary to produce a given amount of alkylate. The natural-gasoline manufacturer is therefore confronted with the problem of producing an isopropane cut as pure as is economically possible.

Some idea of the rigid operating control necessary is the fact that a variation of only 3° F. in the boiling point permits the inclusion of 10 per cent of the isobutane in the bottom product of the fractionator. In many instances the feed to the column would not contain much more isobutane than this, thus a drop of 3° in the boiling point would mean a loss in production of practically all the isobutane. For this reason, manufacture of isobutane is not economically possible in every natural-gasoline plant, and before proceeding with such a project as analysis should be made of the potential feed of normal and isobutane.

## Pressure Maintenance

Pressure-maintenance projects probably were the second largest factor in the construction of new plants. Several such projects, either cooperative or company operated, have been placed in operation during the past year, each depending upon a natural-gasoline plant for supplying the necessary high-pressure gas. Also, in the Maljamar and Loco Hills fields of southeastern New Mexico, two additional cooperative pressure-maintenance programs will soon get under way. This tie-in between the natural-gasoline industry and repressuring or pressure-maintenance projects is becoming more and

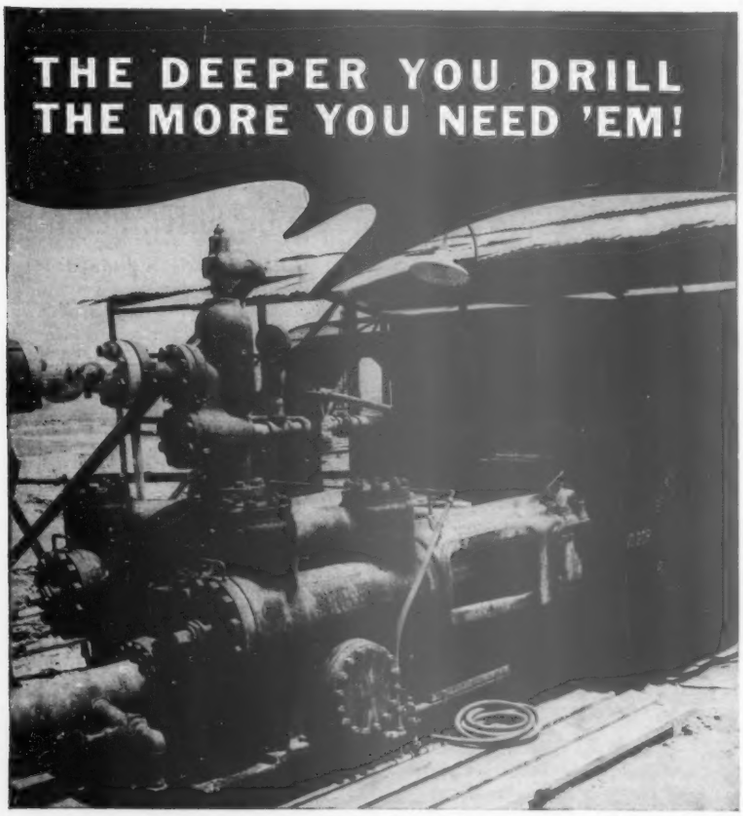
operación necesario es el hecho de que una variación de sólo 3 grados F en el punto de ebullición permite la inclusión de 10 por ciento de isobutano en el producto residual en el fraccionador. En muchos casos, la alimentación a la columna no contendrá más isobutano que esto, pero una caída de 3 grados F en el punto de ebullición significaría una pérdida en producción de casi todo el isobutano. Por esta razón, la manufactura de isobutano no es economicamente posible en toda instalación de gasolina natural, y antes de emprender semejante proyecto, es necesario hacer un análisis de la alimentación potencial de material normal e isobutano.

## Mantención de presión

Los proyectos de mantención de presión fueron probablemente el segundo factor importante en la construcción de nuevas refinerías. Varios

de estos proyectos, en forma particular o en forma cooperativa, han entrado en operación durante el año pasado, dependiendo cada uno de una refinería de gasolina natural para el suministro del necesario gas de alta presión. También, en los campos de Maljamar y Loco en la región sureste de Nuevo Mexico, dos adicionales programas cooperativos de mantención de presión entrarán dentro de poco en operación. Esta unión entre la industria de la gasolina natural y los proyectos de re-presión o mantención de presión, se está haciendo cada día más pronunciada, a medida que los productores se dan mejor cuenta del valor de semejantes programas.

En adición a suministrar a los dueños de refinerías una fácil salida para los gases residuales de la instalación, estos proyectos actúan generalmente en el sentido de proveer a la instalación una carga de gas más compensada para un día de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more pronounced as operators become aware of the value of these programs.

In addition to supplying the plant operator with a ready outlet for the plant residue gas, these projects usually act to provide the plant with a more balanced gas load over a day's period. Under the strict proration schedules applied in most flush fields, normally most of the wells are permitted to produce their allowables during daylight hours. This greatest a heavy load on the plant in the daytime, but does not supply sufficient gas for most efficient operation at night. In most unitized projects, flow schedules are worked out so that the plant does not have such wide fluctuations in raw gas.

Aside from prolonging the number of years over which a gas supply was assured, repressuring and pressure-maintenance projects in the past had comparatively little effect on plant operations due to the comparatively low injection pressures required. Most present projects, however, require residue gas at pressures ranging from 700 or 800 lb. to as high as 3,400 lb. Thus compression equipment operates at much higher pressures and is much larger than the 80 or 160-hp. engines normally used 15 or 20 years ago. Two and 3-stage units of 400 to 800 hp. are the rule rather than the exception in all new plants built.

Operation at these high pressures has brought on no new compressing problems, and use of the large units is justified by their compactness, first cost and maintenance outlays. Compressor-packing leakage and compressor-rod wear are no higher than those experienced under normal compression operations. Also the compressor valves function properly with only little attention due to the improved design of modern compression equipment.

## Plant Operations

Considering natural-gasoline plants as a whole, it may be observed that the absorption process continues to dominate operating procedure as it has for more than a decade. Certain changes and improvements have been introduced in the conventional plant, though in a few instances plants have been built which represent distinct departures from the absorption principle. Some improvements which have taken place include: Provision for purifying the absorption oil; design of more efficient absorption; stripping and fractionation equipment; improved automatic controls for regulating temperatures, pressures and liquid levels; and methods for prevention of gas-hydrate formation in the plant residue.

In general, demand for lighter hydrocarbons has affected the process so that plants are operated to yield the greatest cuts of these fractions economically possible. In absorption plants, butane, propane and other light fractions are stripped more thoroughly from the raw gas by intercooling the lean-oil stream, wider use of reabsorbers and by conducting the operation at higher pressures in order to obtain greater stripping efficiency in so far as these fractions are concerned.

## Use of Reabsorbers

Where reabsorbers are employed the oil from the main absorber is passed to intermediate and low-pressure vent or dewatering tanks. In each stage the lighter gasoline fractions are flashed from the oil streams and then are passed to reabsorbers where they again contact lean-oil streams. Where refrigeration is employed the light ends from the butane tower usually are cut from the reflux in sufficient quantities to cool the absorption oil to the desired temperature. Since the cooling normally is done in closed systems only very little makeup cooling medium is required.

The fact that a wider range of hydrocarbons is being absorbed from the raw gas acts to place a greater load on the fractionating equipment. When 26-lb. natural is the sole product of natural-gasoline plants, fractionation could be carried out in one column and all overhead vapors discarded. In many plants this operation is now just the first of a series; the overhead vapors being progressively charged to debutanizing, depropanizing and deethanizing columns. Because relatively small quantities of these fractions are present in the charging stock to each tower, exact control is required at each step.

*Combination still and dephlegmator installed in a modern natural-gasoline plant where minute fractionation is the chief objective.*

*Combinación de alambique y despegmador instalada en una moderna refinería de gasolina natural donde el objetivo principal es la fraccionación minúscula.*

trabajo. Bajo los reglamentos de estricto prorrateo que se aplican a casi todos los campos activos, se permite normalmente que casi todos los pozos produscan sus cuotas fijadas durante las horas diurnas. Este establece una gran carga en la instalación durante el día, pero no suministra gas suficiente para el trabajo más eficaz en la noche. En los proyectos más corrinados, los programas de alimentación se arreglan de modo que la instalación no tenga semejantes fluctuaciones en gas crudo.

Además de prolongar el número de años de un seguro abastecimiento de gas, la re-presión y mantención de presión tenían, en el pasado, un efecto comparativamente limitado sobre las operaciones de la refinería, debido a las inyecciones de presiones comparativamente bajas que se necesitaban. Casi todos los proyectos actuales, sin embargo, requieren gas residual a presiones que varían de 700 u 800 a 3.400 libras. Por esta razón, el equipo de compresión funciona a presiones mucho más altas y es mucho más grande que los motores de 80 o 160 cdf. que se normalmente se usaban 15 o 20 años atrás. Los grupos de dos o de tres etapas, de 400 a 800 cdf. son ahora la regla, más bien que la excepción, en todas las instalaciones recientemente construidas.

La operación de estas altas presiones no ha introducido ningún nuevo problema de compresión, y el uso de los compresores más grandes se justifica por su tamaño limitado, precio inicial y gastos de conservación convenientes. Los escapes por las empaquetaduras del compresor y el desgaste de las bielas de los compresores no son más grandes que los que anteriormente se presentaban con el antiguo equipo. Por otra parte, las válvulas del compresor funcionan correctamente con sólo muy poca atención debido al refinamiento en tipo y construcción de los compresores modernos.

## Operaciones de la instalación

Considerando las refinerías de gasolina natural como un grupo, se observa que el procedimiento de absorción continúa dominando en esta industria, como lo ha hecho desde hace más de una década. Ciertos cambios y mejoras se han introducido en la instalación corriente, a pesar de que pocos son los casos de instalaciones recientemente construidas que representen un cambio radical del principio de absorción. Entre las mejoras que se presentan se incluyen las siguientes: método práctico para purificar el petróleo de absorción; construcción de equipo de absorción más eficaz; mejor equipo de regeneración y fraccionación; controles automáticos perfeccionados para regular las temperaturas, presiones y niveles líquidos; y métodos para evitar la formación de hidratos gaseosos en los residuos de la instalación.

En general, la demanda de hidrocarburos más volátiles ha afectado al procedimiento, de modo que las refinerías se operan para que produzcan la mayor cantidad de estas fracciones de la manera más económica posible. En las instalaciones de absorción, el butano, propano y otras fracciones volátiles se sepran de una manera más completa del gas crudo mediante el enfriamiento de la corriente de petróleo tratado, mayor uso de reabsorbentes y desarrollando el trabajo en general a mayores presiones, a fin de obtener un mayor rendimiento en la separación en lo tocante a estas fracciones más volátiles.

## Uso de reabsorbentes

Cuando se emplean reabsorbentes, el petróleo del absorbente principal se pasa a tanques intermedios y tanques de baja presión o desparafinadores. En cada etapa las fracciones más volátiles de la gasolina se desprenden de la corriente de petróleo y se pasan luego a reabsorbedores donde de nuevo se ponen en contacto con la corriente de petróleo tratado. Cuando se emplea refrigeración, las fracciones volátiles de la torre de butano generalmente se separan del reflujo en cantidades suficientes para enfriar el petróleo de absorción a la temperatura deseada. Como el enfriamiento se hace normalmente en un sistema tapado o cer ado, se requiere sólo muy poca cantidad de medio de enfriamiento.

El hecho de que una mayor cantidad de hidrocarburos se está absorbiendo del gas natural actúa en el sentido de imponer una mayor carga sobre el equipo de fraccionación. En muchas instalaciones, la operación se lleva a cabo en serie. Los vapores superiores progresivamente se cargan en las columnas de debutanización, depropanación y detanización. A causa de que cantidades relativamente pequeñas de estas fracciones se presentan en el material de carga que va a cada torre, se requiere un control exacto en cada paso.

### THE COVER PICTURES

**Pictures on the cover page of the Spanish-English section show views of two typical drilling operations in South America. Argentina's newest and among its most prolific fields is Tupungato in the Province of Mendoza to which the rugged Andes Mountains form a picturesque backdrop. A view of the producing area with the snow-capped peaks in the background is on the upper portion of the cover page. Exploration under the water of Lake Maracaibo in western Venezuela has been among the most interesting operations for years in South America. Spread of exploration to as much as 7½ miles from shore requires a full complement of marine equipment such as is shown in the lower cover-page picture.**

# GUIBERSON TOOLS

# Las HERRAMIENTAS GUIBERSON

## THE GUIBERSON SWAB

Has no equal for efficiency and economy in swabbing operations. Flexible cups, an exclusive feature, embody correct swabbing principle. Running in, fluid compresses cup inward, insures speed in lowering, prevents wear. Coming out, fluid weight expands cups outward to give perfect, constant contact and full recovery.

Speedier to change cups. Some cups fit slightly varying diameters of tubing and casing. Swab falls with maximum speed. Flexible cups take up wear. Wires and molded-in reinforcing bushing take most of load. Type "A" Swab, employing the same principle as the Type "K," is also available.

## EL ESCOBILLON GUIBERSON

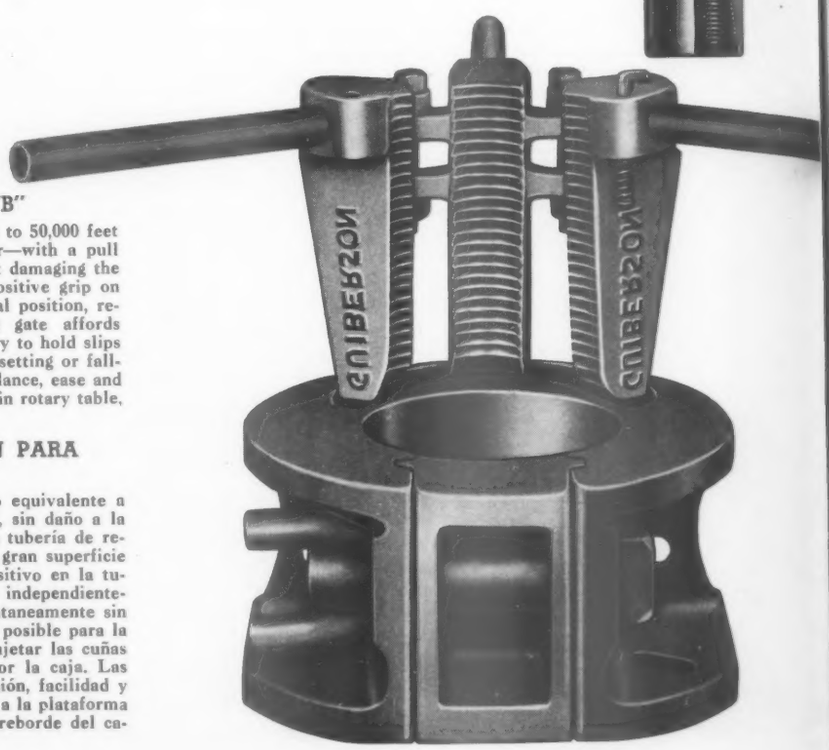
No tiene rival en efectividad y economía en los trabajos de limpieza. Las tazas flexibles, un rasgo exclusivo, comprenden el correcto principio de limpieza. Al bajar, el líquido comprime la taza hacia adentro, asegurando rapidez en el descenso y evitando el desgaste. Al subir, el peso del liquido extiende las tazas hacia afuera, dando contacto constante perfec o y recuperación completa. El cambio de las tazas es más rápido. El escobillón o limpiatubos cae con máxima velocidad. Las tazas flexibles compensan el desgaste. Los alambres y el buje moldeado de refuerzo reciben casi toda la carga. El tipo "A", igual en principio al tipo "K", es también muy útil.

## CUP PACKER—TYPE "GW"

Cups expand with the well pressure, thus neither tubing weight nor other mechanical means are required to effect a seal. Flexible cup lip assures pack-off at low or high pressure, runs through tight spots in casing and varying inside pipe diameters. Sturdy construction allows cups to be used repeatedly without danger or failure. *The Type "GW" Packer Cups* are extensively used in high and low pressure applications or cementing tools, acidizing tools, perforation cleaners, bailers, liner setting tools, special swabs, well testing tools, etc.

## TAPON DE TAZA O COPA—TIPO "GW"

Las tazas se ensanchan con la presión del pozo, y por esta razón no hay necesidad del peso de la tubería o de otro medio mecánico para efectuar el cierre. El labio flexible de la taza asegura cierre a baja o alta presión, y asegura el paso por puntos apretados en la tubería y variables diámetros interiores del tubo. Firme construcción permite usar las tazas repetidamente sin peligro ni falla. *Las tazas de tapon, tipo "GW"* se usan mucho en aplicaciones de alta y baja presión o herramientas de cementación, herramientas de tratamiento ácido, limpiadores de perforación, achicadores, herramientas de instalar revestimiento, escobillones o limpiatubos especiales, herramientas de ensayo de pozo, etc.




## GUIBERSON TUBING SPIDER—TYPE "B"

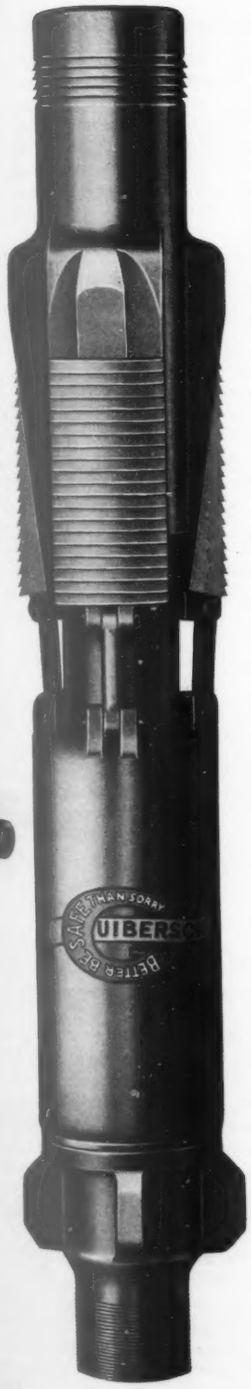
Exceptionally light. Tested with a load equivalent to 50,000 feet of 2" upset tubing without damage to the spider—with a pull equivalent to 20,000' of 2½" upset tubing without damaging the tubing. Large slip area and full contact assure positive grip on tubing. Slips fit true in bowl regardless of vertical position, release instantly, without sticking. Non-jamming gate affords greatest ease in placing around tubing. Unnecessary to hold slips when pulling or running in, to prevent accidental setting or falling off bowl. Slips unmatched for light weight, balance, ease and speed of operation. Bottom flange, designed to fit in rotary table, has slots for fastening to well head flange.

## CRUCETA O ARAÑA GUIBERSON PARA TUBERIA — TIPO "B"

Exceptionalmente liviana. Ensayada con un peso equivalente a 50.000 pies de tubería de recalco exterior de 2", sin daño a la cruceta—con un tiro equivalente a 20.000 pies de tubería de recalco exterior de 2½" sin daño a la tubería. La gran superficie de cuña y contacto completo aseguran agarro positivo en la tubería. Las cuñas ajustan exactamente en la caja, independientemente de la posición vertical, y se sueltan instantaneamente sin trabarse. La compuerta ofrece la mayor facilidad posible para la colocación de la tubería. No hay necesidad de sujetar las cuñas al subir o bajar, para evitar el escurrimiento por la caja. Las cuñas no tienen rival en peso liviano, compensación, facilidad y rapidez de trabajo. El reborde al fondo, adaptado a la plataforma de la rotativa, tiene ranuras para su sujeción al reborde del cabezal del pozo.

# *are used wherever* OIL *is* FOUND

# *se usan en todo lugar donde hay* PETROLEO




### TUBING CATCHER—TYPE "E"

All Guiberson Tubing Catchers employ the same principle. Fall of tubing is stopped within three inches. When tubing drops, fall of weight and slips is retarded by spring, and wedge-shaped head forces slips outward to grip casing walls. Tubing Catcher hangs free, except when tubing anchors are used on pumping wells to eliminate tubing movement in phase with pump. There is a correct type and size of Guiberson Catcher for every depth and for every size and weight of casing. Short, compact design permits running even in crooked holes.

### PESCATUBO—TIPO "E"

Todos los atrapadores de tubería o pescatubos Guiberson emplean el mismo principio. La caída de la tubería se para dentro de tres pulgadas. Cuando cae la tubería, la bajada del peso y cuñas se retarda por resorte, y una cabeza en forma de cuña hace abrirse hacia afuera a las cuñas para agarrar las paredes de la tubería. El pescatubo queda libre, salvo cuando se usan anclas en los pozos de perforación, para eliminar el movimiento de la tubería en fase con la bomba. Hay un tipo y tamaño correcto de pescatubo Guiberson para toda profundidad y para cualquier tamaño y peso de tubería. La construcción corta y compacta permite su uso hasta en agujeros torcidos.

### TYPE "C-I" CONTROL-HEAD PACKER

Guiberson Control-Head Packers are the most efficient packers yet developed. Type "C-1" has 3" vertical valve openings and is a single-rubber packer. Packing medium is Neoprene, a long-lived, highly oil-resisting compound which will not disintegrate or stick to pipe. Control-head feature is most valuable for running in flowing wells, in wells having heavy fluid, for testing purposes when tubing is plugged, and for acidizing purposes. This packer places operator in full control of his well, at all times. Also offered in heavy Type "K" model for deepest wells and severest applications. Available with valve openings of 8" and 30" and without valve.

### TAPON DE CABEZA DE CONTROL, TIPO "C-I"

Los tapones de cabeza de control Guiberson son los más efectivos de su clase del mercado. El tipo "C-I" tiene aberturas verticales de válvula de 3" y es un tapón sencillo de caucho. El material de empaque es Neopreno, una composición muy durable de gran resistencia al petróleo, que no puede disolverse o pegarse al tubo. El rasgo de cabeza de control es muy valioso para la introducción en pozos emanantes, en pozos con flúido pesado, para fines de ensayo cuando la tubería está obturada o para el tratamiento ácido. Este tapón da al operario control completo de su pozo, en todo momento. También ofrecemos el tipo "K" pesado, para los pozos más profundos y aplicaciones más severas. Suministrados con aberturas de válvula de 8 y 30" y sin válvula.

### GUIBERSON TYPE "H3R" PACKER

The Guiberson Type "H3R" is the ideal production packer. Ease in setting and pulling from well, full recovery of rubbers without damage, fluid by-pass when pulling, dovetailed slips and seamless steel mandrel of upset diameter, enable this packer to handle toughest well applications.

Packing rubber design is radically different. Consists of three packing rings of oil-resisting compound, the end rings having molded-in steel bushings and hairpin reinforcing wires. Excellent for wells of any depth or in wells where differential pressures reach 6,000 lbs. per sq. in.

### TAPON GUIBERSON, TIPO "H3R"

El Guiberson de tipo "H3R" es el tapón ideal de producción. Fácil de colocar en el pozo y de quitarlo del mismo, completa recuperación de las piezas de caucho sin daño alguno, desviación del flúido en la subida, cuñas de cola de milano y mandril de acero sin costura de diámetro de recalco exterior, hacen que este tapón se adapte perfectamente al manejo de las más difíciles aplicaciones en el pozo.

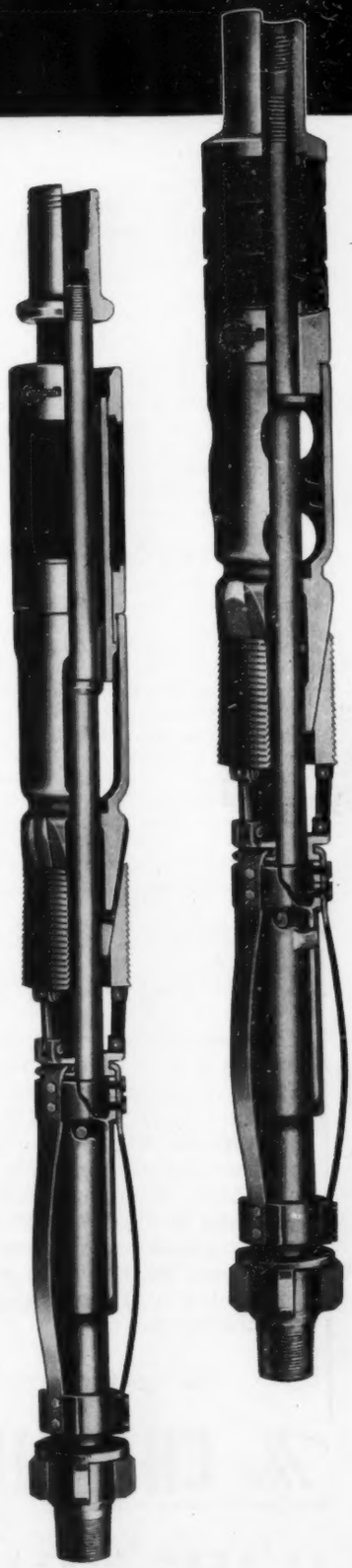
La construcción del empaque de caucho es radicalmente diferente. Consiste en tres anillos de empaque de composición resistente al petróleo. Los anillos laterales tienen bujes de acero y alambres delgados de refuerzo. Excelente para pozos de cualquiera profundidad o para pozos en que las diferentes presiones llegan hasta 6000 libras por pulgada cúbica.

### OTHER GUIBERSON TOOLS

GUIBERSON also manufactures Drilling Heads, Tubing Wire Line and Sucker Rod Oil Savers, Semi-Automatic Spiders, Gas-Lift Equipment, Spiral Formation Packers, and Quick-Change Unions. For further information, see Guiberson Section, 1942 Composite Catalog, or write

### OTRAS HERRAMIENTAS GUIBERSON

GUIBERSON fabrica también cabezas de perforación, economizadores de petróleo para tubería y varillas de bomba, crucetas o arañas semiautomáticas, equipo de inyección de gas, tapones de formación espirales y uniones de rápido cambio. Para información completa, vea la sección de Guiberson, en el catáloga compuesto, o escriba directament



## THE GUIBERSON CORPORATION

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***California Representative:*** **W. R. Guiberson Co., Los Angeles, Calif.**
***Export Representative:*** **I. Frank Brown, New York City**

## Mountains Give Soviet Oil Fields Stout Protection

*(Continued from Page 78)*

through numerous, easily blocked, long tunnels high in the mountains.

The Maikop and the Grozny districts lying in the foothills quite a distance from the neighboring plains are serviced by road systems winding through ravines and over numerous local passes or crests. Neither district could be taken militarily by a flanking or enveloping movement. Direct frontal operations against Soviet forces occupying all of the commanding heights would be required. To be in a position for an assault on the fields, the Germans would first have to take and successfully hold Rostov on the Don and a bridgehead on the Taman Peninsula across from Kerch, then advance 150-200 miles along terrain as difficult as any they have traversed to date. (See Routes 1 and 2, Fig. 2.) If the Germans were successful in eventually capturing the Maikop fields, the prize would be relatively small in view of the Soviet scorched-earth policy, whereas the loss to the Soviets of 37,500-bbl. per day production would not be serious. The same considerations govern the fields of Grozny, only the distances involved in the necessary military drive are 400-500 miles. (See Route 3.) The capture or destruction of the refining centers of Krasnodar or Grozny would deprive the Soviets of these minor facilities but would be of no direct assistance to the Germans.

### Baku Capture Difficult

The capture of the Baku region (800-850 miles from Rostov or Kerch) is infinitely more difficult than either of the above. One possible approach is a drive to the Caspian Sea and then down the coast. On this road there are many narrow mountain passes easily commanded by artillery on the surrounding heights. The pass at Derbent is especially difficult, its fame dating back to the Crusades. (See Route 4.) Another route is across the Georgian Military Highway from Ordzhonikidze to Tiblisi (Tiflis), thence down the Kura River Valley to Baku. This highway crosses the back of the Caucasus over a formidable pass at least 7,500 ft. in elevation and proceeds along a narrow, winding road cut out of steep mountain sides. To further complicate this route, the upper reaches of the Kura Valley are narrow and tortuous. (See Route 5.) Still another route is across the Ossetian Military Road from approximately Pyatigorsk to Kutais, again over the back of the mountains and over a pass at least 9,000 ft. in elevation followed by a drive over extremely difficult mountain terrain to Gori and down the Kura River Valley as above. This route is more difficult than Route 5. (See Route 6.) The last remaining route encompasses the capture of the port of Batum either by a drive down the Black Sea coast or a direct sea landing. The road along the coast bridges deep chasms around which there are no roads and, at some places, is cut out of sheer cliffs. In either event, if Batum could be taken it would then be necessary to drive along the difficult southern flank of the Caucasus to Kutaisi, Gori, Tiblisi, down the Kura River Valley to Baku. (See Route 7.) This is extremely difficult and could not even be attempted until Germany had complete control of the Black Sea through destruction of the Soviet Black Sea Fleet.

At this point it is interesting to note that even if Turkish territory should be used from which to attempt to take Baku, it is still a herculean task, as the mountains south of the main Caucasus range, previously described, offer problems of the same character and magnitude as those mentioned.

In light of German difficulty in traversing the flat plains of Central Russia and the Ukraine, it seems highly improbable that she would meet with any outstanding success in the infinitely more difficult terrain of the Caucasus. Only the capture of the Baku area would be of real significance from the standpoint of sizable supplies to Germany. Undoubtedly, all fields, pipe lines and refineries would be destroyed by the Russians. Rehabilitation, even for local use, would require much time and material, neither of which Germany can afford. The loss of Baku would, however, be serious though no fatal to the Soviets even though the fields might not be utilized by the Germans for some time.

To force capitulation of the Soviet Union would involve the cutting of all Soviet sources of vital supplies, especially oil. This would necessitate a drive to Stalingrad and Astrakhan on the Volga and Caspian Sea. While this would be no simple task, the distances being 250 and 400 miles respectively (see Routes 8 and 9), the possibilities of accomplishment seem greater than an attack on the Caucasus.

Such a maneuver would undoubtedly exhaust Germany's remaining storage. She would still have, however, her current production to meet the industrial and political requirements of all of Europe, her extended communications to a far-flung front, as well as those of her fighting forces at the front. To the author it seems that of necessity this would mean a sharp restriction of the use of mechanized equipment at a front so far removed from the sources of meager supplies. It seems unlikely that Germany could get more than a small fraction of her output to her entire far-flung front, leaving little if any to be used in large-scale mechanized combat.

### May Force Germany on Defensive

Barring a drastic reversal in international politics, which would permit her to get oil freely from outside Europe, Germany may soon be compelled to alter her method of warfare to that of defensive. Such a defensive war might be extended but in the end would be disastrous for Germany. The Soviets' superiority in raw materials, manpower and ever-expanding industry would be decisive.

If the Caucasus source of supply were cut, the Soviets would rely on the production of the Ural-Volga region and upon their storage. Because of the restricted Ural-Volga production, as her storage was depleted she, too, would face a restriction of mechanized warfare.

The Soviet Union reported the Ural-Volga region's 1940 production as 50,000 bbl. per day or a total of 18,000,000 bbl. It is in this region that the Soviets have concentrated their energies in recent years. While results of such efforts have been considered a military secret and no reliable figures are available, considerable evidence points to a rapid expansion in this area. The discovery of new fields, blocking out and shutting in of reserves, etc., has been the established policy of this region. Consequently, the production figures have not indicated the potentialities for rapid expansion in this area. Thousands of proved but undrilled locations are reported available at such fields as Tuimazy (discovered 1937, area expanded 1940), Buguruslan (1940), Aktiubinsk (expanded 1939), Penza (1940), Syzran (1937), Yablonovo (1939), Kuibishev (1941), Ukhta (expanded 1940), Buzuluk (1941), Chkaloff (1941), etc. In the Tuimazy field alone over 100,000 acres are reported proved for good production at depths less than 4,500 ft. and large flush wells are being brought in at Buguruslan from 740-1,000 ft.

While production in the U.S.S.R. has grown during recent months, the Ural-Volga region's importance has accelerated as follows: In 1932 it equaled 0.3 per cent of total Soviet production; 1935, 1.6 per cent; 1938, 4.3 per cent; 1939, 6.4 per cent; 1940, 8.3 per cent. The modern large refinery at Ufa has been expanded to take care of the growing production as have other refining centers. The pipe-line system has also expanded, another loop of the Ishimbaevo-Ufa system having been completed July 1, 1940. (For an example of the extent of the development in the U.S.S.R. during 1938, the last date such material was available, see article by author, The Oil and Gas Journal, December 28, 1939.)

That the Soviets are aware of the potentialities and needs for expansion of this area is attested to by the large quantities of petroleum drilling and refining equipment purchased recently in the United States. As early as last February, the Soviets had ordered over $10,000,000 worth of aviation-gasoline producing equipment. In the


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month of December 1940, alone, she bought $800,000 worth of field and producing equipment which did not fall under the moral embargo, then in effect. In 1940, the Soviets placed orders for eighty 2,500-ft.-capacity drilling rigs, forty-five 4,000-ft. rigs and also made preliminary inquiry for over 150 others capable of drilling between 5,200 and 12,000 ft. It has been estimated that in the last 2 years the Soviets have purchased approximately 200 portable drilling units alone, with 4,000-ft.-depth capacity—many of them truck-mounted.

During 1941, the expansion program has undoubtedly been accelerated. Thus, the total quantity of available petroleum products would exceed the 50,000 bbl. per day reported for 1940. This expanded production plus the available storage, plus the relatively short distance to the fighting front, if the Germans reached Stalingrad or Astrakhan, makes it appear likely that the total quantity of Soviet petroleum products reaching the front would at least equal Germany's delivery. Another factor that must not be overlooked is the possible transport of petroleum products from the Caucasus region via the Caspian Sea to the Gurev-Orsk line. This pipe line carries the Emba oil (lumped with Ural-Volga region) to rail lines feeding the large industries of the Urals. Oil could also be moved across the Caspian to the Turksib railroad, thence back to the Urals. This would be an extremely difficult transport problem but under extreme circumstances could be solved.

In the opinion of the author, even the cutting off of the Caucasus region from the remainder of the Soviet Union by a drive to the Caspian Sea would not place Germany in position to force Soviet capitulation. It might, however, in the main, change the entire character of the war to a nonmechanized one. If so, the United States would be called upon to deliver large quantities of petroleum products to the U.S.S.R. in order that the Soviets could deliver a decisive military blow against Germany. Such a program might entail the expansion of the American production and refining branches by an additional 500,000-600,000 bbl. per day and also, the expansion of rail and sea-transport facilities to deliver this huge quantity to Russia.

Another possible solution or complementary action to the delivery of such large quantities of petroleum products would be American assistance in the expansion of Soviet reserves and refining capacity in the Ural-Volga region. This would ease the tremendous transport problem involved in continuous, direct oil deliveries. Such a program contemplates a thorough geological and engineering study of the area in the Soviet Union, and, if required, the delivery of materials and skilled personnel for drilling and refining operations. It is possible that such a survey is now under way.

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## Arch F. Campbell Named Sales Manager for Superior Engine

Arch F. Campbell, former branch manager at Tulsa for Waukesha Motor Co., has been appointed manager of sales for the Superior Engine Division of National Supply Co. Mr. Campbell has been affiliated with the oil industry for the past 22 years in the Mid-Continent area. He is a graduate of University of Michigan. Following service with the U. S. Army as flying officer, he became associated with an independent producer at Ranger, Tex., and in 1920 joined the production department of Phillips Petroleum Co. From 1921 until 1931 he was with Fenwick Reddaway Manufacturing Co., Newark, N. J., as oil-field sales representative. He had been with Waukesha since 1932. In his new position, Mr. Campbell will make his headquarters at Springfield, Ohio.

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## Growth of Spencer Trailer Recounted on 25th Anniversary

The Spencer Trailer Co., Augusta, Kans., pioneer builder of oil-field trailers, is observing its twenty-fifth anniversary. The company was organized in 1916 to answer an urgent need in the oil fields of that day for improved field transportation. Oil companies were just beginning to use trucks, but the one retarding factor in their expanding use was inability to handle long poles, casing or other equipment which would normally not fit on ordinary truck beds. Therefore, F. G. Spencer, founder and president of the company which bears his name, built in his blacksmith shop the first pole trailer for oil-field use.

Use of trailers grew rapidly, and, as the need arose, Spencer built the first tandem-pole trailer, and the first heavy-duty four-wheel oil-field trailers. Subsequent growth of the use of oil-field trailers is synonymous with that of the oil industry itself.

Today, in their modern factory at Augusta, Spencer Trailer Co. manufactures all types of trailers suitable for oil-field use, including their semitrailer, two-wheel pole trailer, heavy-duty pole trailers, four-wheel trailer chassis, and trailers for any special purpose as needed. Also, in their shops they manufacture most of the integral parts of the trailers, such as running gears, axles, brakes, and a complete line of commercial trailers for general freight and liquid fuel operators.

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## Sarawak Wells Demolished

Demolition of producing oil wells and refining facilities in Sarawak, adjacent to British North Boreno, was reported last week in dispatches from Batavia, the capital of the Netherlands East Indies. Properties were destroyed to prevent their falling into hands of Japanese forces.


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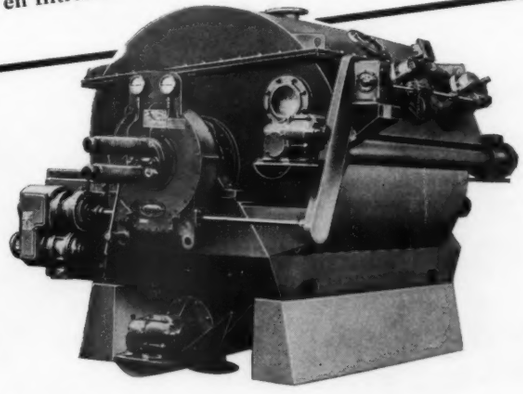

FILTRO OLIVER *Precoat*

(tipo cerrado—accionado al vacío)

Estos es lo que este filtro está haciendo por las empresas petroleras que lo están usando; producción máxima, debido a la gran reducción en pérdida de petróleo por la conglutinación, menor gasto de funcionamiento y conservación, ninguna reparación de elementos de filtración y ningún manejo manual.

*El filtro Oliver Precoat se ofrece para funcionamiento al vacio y de presión.*

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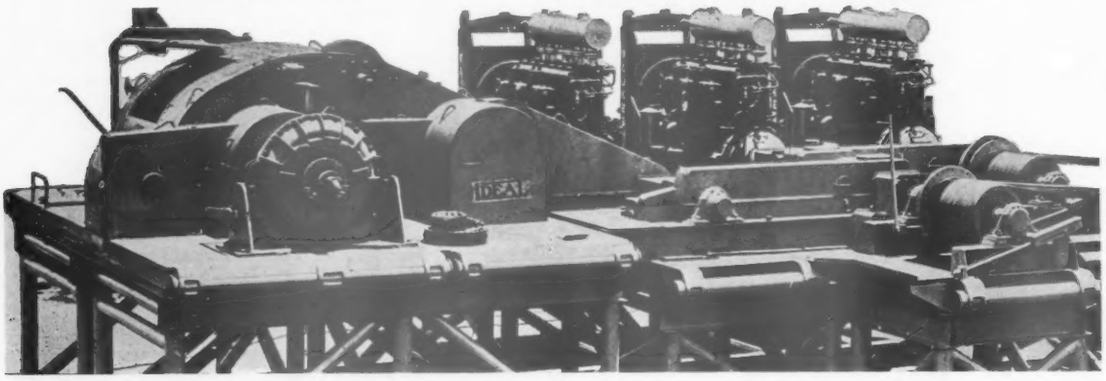
12-OUF-3

# IDEAL Consolidated Rigs

"Reg. U. S. Pat. Off."



**TYPE 75**
**CONSOLIDATED RIG**
**with 3-Engine Hook-up**

**APAREJO DE PERFORACION CONSOLIDADO TIPO 75**
**con combinacion de 3 motores**

**The Type 75 is a smooth-operating, easily portable Rig with six hoisting speeds, three rotary machine speeds, and all the up-to-the-minute features of design. It provides dependable and trouble-free service.**

**National offers a complete line of latest design Streamlined Power Rigs—six different models, for drilling depths ranging from 3,000 feet to 12,500 feet—a size suitable for every need.**

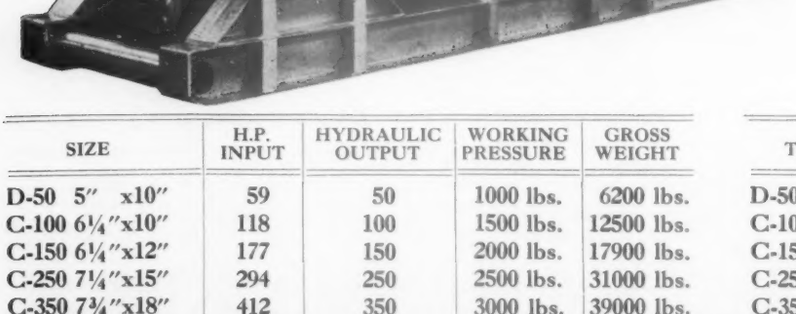
| Type | Recommended Drilling Depth Using Drill Pipe 3½″ | 4½″ | H. P. Rating | Number of Speeds Hoisting | Rotary | Drum Size Diam. & Length, inches |
|---|---|---|---|---|---|---|
| 30 | 3,000′ | ------ | 100 | 4 | 4 | 16 x 36 |
| 40 | 5,000′ | 4,000′ | 150 | 4 | 4 | 16 x 44 |
| 50 | 7,500′ | 5,000′ | 350 | 6 | 3 | 16 x 34 |
| 75 | 10,000′ | 7,500′ | 500 | 6 | 3 | 23½ x 35 |
| 100 | 12,000′ | 10,000′ | 650 | 6 | 3 | 26 x 46 |
| 125 | 14,000′ | 12,500′ | 950 | 6 | 6 | 28 x 42 |

**El tipo 75 es un aparejo de perforación portátil de funcionamiento expedito, con seis velocidades de levantamiento, tres velocidades de rotativa y con todos los rasgos de construcción más recientes. Asegura servicio seguro, exento de molestias.**

**La National ofrece una serie completa de aparejos de perforación de fuerza mecánica del más adelantado tipo de construcción —seis modelos, para profundidades de perforación de 3000 a 12.500 pies—un tamaño para cada requisito.**

| Tipo | Profundidad de perforación recomendada, usando tubo de perforación de 3½″ | 4½″ | cdf. | Número de velocidades De levantamiento | De rotativa | Tamaño de tambor Diámetro y longitud en pulg. |
|---|---|---|---|---|---|---|
| 30 | 3,000′ | ------ | 100 | 4 | 4 | 16 x 36 |
| 40 | 5,000′ | 4,000′ | 150 | 4 | 4 | 16 x 44 |
| 50 | 7,500′ | 5,000′ | 350 | 6 | 3 | 16 x 34 |
| 75 | 10,000′ | 7,500′ | 500 | 6 | 3 | 23½ x 35 |
| 100 | 12,000′ | 10,000′ | 650 | 6 | 3 | 26 x 46 |
| 125 | 14,000′ | 12,500′ | 950 | 6 | 6 | 28 x 42 |

# IDEAL POWER PUMPS



**IDEAL POWER PUMPS**

**There is a proper Power Pump selection for each of the above rigs, in accordance with horsepower and working pressure requirements.**

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**Para cada tamaño de aparejo de perforación anotado arriba hay una bomba mecánica adecuada, que responde exactamente a los requisitos de fuerza mortríz y presiones de trabajo.**

| SIZE | H.P. INPUT | HYDRAULIC OUTPUT | WORKING PRESSURE | GROSS WEIGHT |
|---|---|---|---|---|
| D-50 5″ x10″ | 59 | 50 | 1000 lbs. | 6200 lbs. |
| C-100 6¼″x10″ | 118 | 100 | 1500 lbs. | 12500 lbs. |
| C-150 6¼″x12″ | 177 | 150 | 2000 lbs. | 17900 lbs. |
| C-250 7¼″x15″ | 294 | 250 | 2500 lbs. | 31000 lbs. |
| C-350 7¾″x18″ | 412 | 350 | 3000 lbs. | 39000 lbs. |

| TAMANO | C. de F. | RENDIMIENTO HIDRAULICO | PRESION DE TRABAJO | PESO BRUTO |
|---|---|---|---|---|
| D-50 5″ x10″ | 59 | 50 | 1000 lbs. | 6200 lbs. |
| C-100 6¼″x10″ | 118 | 100 | 1500 lbs. | 12500 lbs. |
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# FIELD DEVELOPMENTS...

## HIGHLIGHTS FROM THE WEEK'S NEWS—

Completions reported during the past week dropped from 637 to 596, oil-well completions being responsible for the whole decline as well as offsetting the increase of 6 in the number of gas wells. The normal seasonal decline in the number of completions is still not apparent in this year's operations, which will probably run nearly 2,000 above those of last year.

Developments during the week, however, show a considerable slackening in interesting features as the wildcatting campaign draws to a close. The year's wildcatting appears to have been more successful than in recent years, although several sectors which were thought highly favorable have proved disappointing so far. The deep drilling campaign in eastern Ohio has proved almost universally disappointing but a rich Clinton oil pool was opened in Perry County. In Michigan, the latter half of the year witnessed a considerable extension of the producing belt of which Reed City was by far the outstanding development. Illinois has had a successful year with such pools as Benton, Johnsonville, Rural Hill and others which will probably surpass last year's crop in importance.

In Kansas, the extension of the Barton arch play to and across the Nebraska State line has accomplished little but one of the most significant discoveries of the year was made in Kearny County. The Viola trend in Stafford and Reno counties and the discovery of Simpson and Kansas City production in Barber County will prove of importance during the next year. The latter is a part of the large Anadarko basin play which centered in Central Oklahoma around Apache.

In North Texas, prospecting around the north end of the Fort Worth basin continued to meet with success but the most important development was the finding of Ellenburger production in many of the older fields in the district. East Texas saw little of importance, except Hawkins but in North Louisiana, the Wilcox trend play drew much attention as field after field was brought in in the Olla area. This Wilcox play extended far to the southwest with the region around Conroe furnishing most of the excitement in Texas.

Besides the Wilcox trend play, the coastal area had several others which yielded rich returns and promise even more. These include the deep flank development of old domes, the Jackson County play, the finding of flank oil production in several gas-distillate fields and growing activity in the southern sector. West Texas has had an interesting Ordovician play along the Pecos River and the Clear Fork lime has proved productive at Lubbock, although the discovery well was not too promising.

Development of the Tensleep production in northwestern Carbon County highlighted Rocky Mountain activity, while in California the eastern end of the coastal district and the San Joaquin Valley north of Coalinga furnished much excitement and gave promise of intensive development in the near future.

**OKLAHOMA:** Shows in a wildcat between Binger and Cement lead to speculation concerning the type of structure that has been found. If the Simpson runs as high as some geologists believe, the granite ridge type of structure may extend a considerable distance into the Anadarko basin and chances for a major field are correspondingly increased. A new pool has been opened near West Loco in Stephens County.

**CALIFORNIA:** After several weeks of uncertainty, Amerada's Riverdale wildcat in Fresno County has opened a new field. It is the tenth discovery of the year in California. The heavy oil district in the southeast sector of the San Joaquin Valley is becoming active. A new gas has been found at Del Valle.

**NORTH TEXAS:** Caddo lime pools have been opened in Young and Clay counties, while a third pay is indicated in the Hults-Owens field in Montague County. Here an upper Strawn sand showed oil and gas.

**MONTANA:** Six completions in Bowdoin bring activity in that field to 60 per cent above last year. Another active gas area is east of Cut Bank where the field was extended 1 mile to the east.

**MICHIGAN:** Reed City has been extended west and a wildcat brought in a small gas flow in Osceola County.

**WEST TEXAS:** Gulf and Wentz' Ellenburger discovery in Pecos County, reported recently shows considerable improvement after acidization. In the Sand Hills area, a southeast outpost was completed in the Permian pay after finding the Ellenburger dry.

**ILLINOIS:** The new pool west of the Clay City pool is undergoing a small drilling boom and activity is rapidly increasing. A townsite drilling campaign is in prospect following the recovery of McClosky saturation at a test south of Olney.

Because of irregularity in mails as well as the space devoted to features of international importance in this issue, completions are not reported in detail in this section. Wells as completed during the week ended December 20 and not reported in this issue will be carried January 1.

## COMPLETIONS IN ALL FIELDS . . .

(Week Ended December 20, 1941)

| | Oil | Init. prod. | Gas | Dry | Total | Footage | Tll. comp. to date 1941 | Tll. comp. to date 1940 |
|---|---|---|---|---|---|---|---|---|
| N. Y., Pa., and W. Va. | 92 | 63 | 22 | 5 | 119 | 256,088 | 5,822 | 5,398 |
| Ohio | 7 | 194 | 8 | 9 | 24 | 49,370 | 1,660 | 1,486 |
| Indiana | 4 | 475 | 0 | 5 | 9 | 10,693 | 503 | 453 |
| Kentucky | 3 | 50 | 1 | 1 | 5 | 6,458 | 640 | 599 |
| Illinois | 52 | 12,864 | 0 | 15 | 67 | 189,122 | 3,756 | 3,692 |
| Michigan | 13 | 27,002 | 2 | 4 | 19 | 40,935 | 918 | 1,099 |
| Kansas | 20 | 17,907 | 4 | 15 | 39 | 123,652 | 2,076 | 1,792 |
| Nebraska | 0 | 0 | 0 | 2 | 2 | 4,555 | 82 | 42 |
| Missouri, Iowa | 0 | 0 | 0 | 0 | 0 | 0 | 37 | 36 |
| Oklahoma | 25 | 4,191 | 4 | 20 | 49 | 160,188 | 1,856 | 1,782 |
| Texas: | | | | | | | | |
| North Central Texas | 26 | 3,769 | 2 | 25 | 53 | 120,084 | 2,684 | 2,699 |
| West Texas | 43 | 40,604 | 1 | 2 | 46 | 196,515 | 2,246 | 1,821 |
| Texas Panhandle | 11 | 1,599 | 0 | 0 | 11 | 33,112 | 699 | 544 |
| East Texas | 10 | 1,975 | 2 | 2 | 14 | 71,017 | 1,004 | 616 |
| Texas Gulf Coast | 18 | 4,007 | 0 | 2 | 20 | 124,044 | 1,053 | 1,146 |
| Southwest Texas | 23 | 9,340 | 6 | 11 | 40 | 167,922 | 1,819 | 2,031 |
| Total Texas | 131 | 61,294 | 11 | 42 | 184 | 712,695 | 9,505 | 8,857 |
| North Louisiana | 7 | 469 | 2 | 12 | 21 | 81,284 | 766 | 661 |
| Louisiana Gulf Coast | 8 | 1,678 | 0 | 2 | 10 | 83,332 | 834 | 974 |
| Total Louisiana | 15 | 2,147 | 2 | 14 | 31 | 164,616 | 1,600 | 1,635 |
| Arkansas | 1 | 180 | 0 | 0 | 1 | 5,892 | 193 | 170 |
| Mississippi and Southeast | 4 | 1,587 | 0 | 0 | 4 | 15,300 | 274 | 193 |
| Montana | 5 | 940 | 10 | 3 | 18 | 27,958 | 300 | 236 |
| Wyoming | 1 | 323 | 0 | 0 | 1 | 3,447 | 175 | 158 |
| Colorado | 0 | 0 | 0 | 0 | 0 | 0 | 33 | 18 |
| New Mexico | 5 | 946 | 0 | 0 | 5 | 12,514 | 276 | 590 |
| California | 16 | 8,334 | 1 | 2 | 19 | 98,745 | 1,093 | 980 |
| Total United States | 394 | 138,497 | 65 | 137 | 596 | 1,882,127 | 30,999 | 29,216 |
| Total previous week | 441 | | 59 | 137 | 637 | | | |
| Week ended Dec. 21, 1940 | 335 | | 60 | 124 | 519 | | | |

## Tenth Strike This Year Made In California

By L. P. STOCKMAN

LOS ANGELES, Calif., Dec. 22.—Amerada Petroleum Corp. discovered a new oil and gas field in Fresno County last week, the second it has opened in recent months. The new field is located in the Riverdale district of Fresno County. The earlier strike, made in October 1941 was in the Helm district of Fresno County.

The discovery well at Riverdale was completed flowing 558 bbl. of relatively clean 34.1-gravity oil and 1,375,000 cu. ft. of gas daily from the Miocene with perforations at 6,665-85 ft. This well found the Eocene and underlying Cretaceous wet as formation tests at 7,100-20 ft., 7,460-80 ft. and 7,990-8,016 ft. contained salt water. The Temblor of Miocene age, however, yielded commercial production.

Riverdale is the tenth new field discovered in California during 1941 but due to the retarding of development work in all fields the true importance of each from a production standpoint has not yet been determined. Completion of Amerada's Lawton wildcat as a successful discovery well restores the confidence of field men in possibilities of the Eocene and Cretaceous in the area.

Amerada has deviated somewhat from the conventional California method of drilling in that the discovery wells at Helm and Riverdale were punched down quite rapidly with little coring, and casing was landed in the bottom of the hole and a preselected interval tested by perforating after the cement job. This landing of pipe and subsequent perforating of the casing is especially suitable for these areas due to the relatively thin sands found. It is interesting to note also while commenting on the presence of thin sand lenses in the Riverdale field that a similar condition exists in the Helm and Raisin City fields located in this same general area. All three of these fields were discovered in 1941 and all three have the same general characteristics.

### Heavy Crude Fields Revived

The Mount Poso field has come to life within the past several weeks. Comparatively shallow wells in the field are finished from spud to completion in about 10 days and for this reason many wells are finished and on production before any reports are made public. The resumption of drilling in this field probably reflects the thought that fields producing heavy crude oil will be given increased allowables under the new conservation program in order to meet the heavy demand for fuel oil.

A marked gain in development work has also been noted in the Midway-Sunset area and a number of shallow producers of heavy oil in the Kern River and Midway fields are being cleaned out preparatory to going on steady production again if necessary. Standard Oil Co. is working on a program which when completed will enable about 150 wells to go on production at a day's notice.

### SAN JOAQUIN VALLEY COMPLETIONS

Arvin, Kern County: Texas 1 Jewett, 16-31s-29e, flowed 747 bbl., T.D. 6,380 ft., deepened from 6,211 ft. and recompleted in Santa Margarita.

Belridge, North, Kern County: Belridge 24-27 fee, 27-27s-20e, flowed 110 bbl., T.D. 8,500 ft., Barefoot 8,255-8,500 ft.

Ciervo Nose wildcat, San Benito County: Texas 1 Carter, 3-17s-12e, abandoned in Moreno shale, T.D. 3,268 ft.

Coalinga East, Fresno County: Shell 8-29 fee, 29-19s-15e, pumped 310 bbl., T.D. 2,800 ft., deepened from 2,659 ft.

Coalinga Southeast, Fresno County: Standard 33-31-B fee, 31-19s-16e, flowed 2,164 bbl., T.D. 8,200 ft., Gatchell oil sand 7,917-8,190 ft.

Coles Levee, Kern County: Standard 20-1-G-9 Kern County Land, 9-31s-25e, flowed 13,400,000 cu. ft. gas, T.D. 5,290 ft., Stevens gas sand 5,125-5,277 ft.

Union 2-12 Kern County Land, 12-31s-25e, flowed 391 bbl. and 376,000 cu. ft. gas, T.D. 9,907 ft., P.B. 9,820 ft., Stevens oil sand.

Elk Hills, Kern County: Standard 237 Tupman, 36-30s-24e, pumped 57 bbl., T.D. 3,000 ft., Tupman zone.

Kern River, Kern County: East Puente Oil 4 fee, 20-28s-28e, pumped 5 bbl., T.D. 1,010 ft., P.B. 975 ft., Kern River series.

Kettleman North Dome, Fresno County: Standard 34-35-J fee, 35-21s-17e, flowed 1,200 bbl., T.D. 9,280 ft., lower Temblor.

McDonald anticline wildcat, Kern County: Texas 1 Anderson, 19-28s-20e, abandoned in gray sand and hard shale, T.D. 6,777 ft.

Mount Poso, Kern County: Shell 1 Griffiths fee, 5-27s-28e, pumped 486 bbl., T.D. 1,825 ft., Vedder zone 1,745-1,825 ft.

Shell 37 Security, 16-27s-28e, pumped 120 bbl., T.D. 2,019 ft., Vedder zone 1,989-2,019 ft.

Riverdale, Fresno County: Amerada 45-26 Lawton, 26-17s-19e, flowed 558 bbl. and 1,375,000 cu. ft. gas, T.D. 8,311 ft., Miocene oil sand. Discovery.

## New Gas Zone at Del Valle

Standard Oil Co. discovered a new gas zone in the Del Valle field of Los Angeles County last week. It was found in Standard 2 Sepulveda, 17-4n-17w, at 4,805-95 ft. The zone, however, may have a much greater thickness. On a formation test at 4,805-35 ft. the well flowed at a daily rate of 17,689,000 cu. ft. of gas. This test was for 13 minutes and gas hit the surface in 1 minute. After this test the valve was closed for 18 minutes and then opened again. In 4 minutes the well was flowing at a daily rate of 5,339,000 cu. ft. and at the end of 10 minutes the flow was at the rate of 7,369,000 cu. ft.

### COASTAL DISTRICT COMPLETIONS

Santa Maria Valley, Santa Barbara County: Union 7 Stinson, 28-10n-34w, pumped 364 bbl., T.D. 5,355 ft., Santa Maria zone.

Ventura Avenue, Ventura County: Associated 114 Lloyd, 26-3n-23w, flowed 840 bbl. and 1,368,000 cu. ft. gas., T.D. 9,394 ft., lower Pliocene oil sand.

## Conservation Plan Delays Basin Work

Development work in the Inglewood field has shown a tendency to slow down which probably reflects the decision of operators to retard work pending complete clarification of the new production plan for District 5. Instead of starting work on wells in the hope of being allowed to complete them before the lid is clamped down operators are awaiting developments. There is no assurance that any well will be allowed to produce even when finished. There are at present five drilling wells in the Inglewood field and they will probably be carried to completion regardless of whether they will be allowed to produce.

### LOS ANGELES BASIN COMPLETIONS

Inglewood, Los Angeles County: Hogan Petroleum 4-A Machado, 7-2s-14w, flowed 1,850 bbl., 1,000,000 cu. ft. gas, T.D. 8,350 ft.

Torrance, Los Angeles County: Los Feliz Oil 1 Capitol, 5-4s-14w, pumped 131 bbl., T.D. 3,690 ft., equivalent of Ranger zone.

Wilmington, Los Angeles County: Atlantic 5 Water & Power, 33-4s-13w, pumped 135 bbl., T.D. 3,640 ft., Ranger zone.

Lee Davis 2 Harbor, 29-4s-13w, flowed 151 bbl., T.D. 3,713 ft., Ranger zone.

Ring Oil Co. 7 Harbor, 32-4s-13w, pumped 125 bbl., T.D. 3,100 ft., Ranger zone.

Union Pacific R. R. 38 Edison, 3-5s-13w, flowed 847 bbl., T.D. 3,520 ft., completed in Ranger and Terminal zones, but only Terminal zone open to production.


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## Western Oklahoma Wildcat Logs Valuable Information

By ROBERT INGRAM

TWO thousand feet of oily mud was recovered on a drill-stem test last week at Amerada Petroleum Corp. 1 Sprague, SE NW 11-8-12w, a wildcat in Caddo County. The test was taken from a sand section cored from 9,451-61 ft. and drilled to 9,472 ft. Earlier in the week a show of black oil and gas was reported in sand at 9,446-51 ft. After the test, operators were drilling ahead.

Of even more interest than the oil shows, however, was the subsurface information revealed by the well. It was started as a 12,000-ft. test in a section of the Anadarko basin known to be very deep. It is about 12 miles southwest of the old Binger producer—where another wildcat is being drilled—and about the same distance northwest of the Cement field.

When the well was started, it was expected that a very thick section of Permian and Pennsylvanian would be found. However, some geologists of the area last week were inclined to believe the section resembles that of Oklahoma City and the Simpson-Wilcox sands are higher than expected. It is just this kind of information about the Anadarko basin that the state's oil men are seeking, and thus the Amerada well is being watched with unusual interest regardless of oil shows.

### Good Initial Reported in Pool Opener Near West Loco

Another unexpectedly good well opened a pool in Stephens County last week. It was Winkler and Carl Carter 2 Peck, NE SE NE NE 1-3s-6w, which flowed 400 bbl. of oil and made an estimated 10,000,000 cu. ft. of gas from a section perforated through casing at 1,180-1,230 ft. and acidized. The well is about 3 miles west of the Loco pool and near the new West Loco pool. . . . Cities Service 1 Babcock, SE NE NE 10-15-4w, near Navina in Logan County, was drilling below 6,596 ft. in dolomite lime where it had a slight show of gas. It is checking some 70 ft. higher than a nearby dry hole.

### OKLAHOMA COMPLETIONS

#### Wildcats

Carter County: McElreath-Suggett 1 Kern, SE NW SE 20-3s-1w, dry, T.D. 3,516 ft., base Pontotoc and top Hoxbar 3,049 ft.

Creek County: Shell 1 Bishop, NE NE SW 12-15-8, gaged 6,250,000 cu. ft. gas, Dutcher 3,083-91 ft., T.D. 3,790 ft. *Discovery.*

Central Commercial Oil 1 Bruce, NE NE NW 33-17-10, dry, T.D. 3,039 ft.

Grady County: Ray Stephens 1 Johnson, NW NE NW 18-5-8w, dry, T.D. 4,556 ft.

Hughes County: H. G. Marshall 1 Neff, W½ SW SE 27-5-10, dry, T.D. 5,201 ft.

Jones 1 Bryant, SE SW SW 29-5-9, dry, T.D. 2,511 ft.

Jefferson County: McLaughlin 1 Coffer, SW SE SW 26-4s-9w, dry, T.D. 3,110 ft., Arbuckle 2,780 ft.

Kay County: Ray Ostot 1 Ashbrook, NW NW SW 7-27-1w, location abandoned.

Lincoln County: Wilcox Oil & Gas 2 Royer, NW SW NE 18-14-6, dry, T.D. 4,110 ft., Bartlesville 3,733 ft.

Love County: Walter Neustadt 1 Wilkins, SE SE SE 8-6s-2e, dry, T.D. 2,505 ft.

Noble County: Carter 1 State, NE NE SW 13-21-2, dry, T.D. 4,471 ft., Wilcox 4,408 ft.

Okfuskee County: John Droppleman 1 Yahola, NE NE SW 15-11-10, gaged 3,500,000 cu. ft. gas and 5 bbl. water, Cromwell 3,144-52 ft., 5-in. 3,895 ft., T.D. 3,946 ft. *Discovery.*

Oklahoma County: Harper & Turner 1 Yeager, SW SE NE 32-14-3w, dry, T.D. 6,325 ft., Bartlesville 6,257 ft.

Pontotoc County: Lake Oil 1 Moore, SE NW NE 28-5-4, dry, T.D. 2,891 ft., Viola 2,672 ft.

Pottawatomie County: Crosbie and Atlantic 1 Hudson, NW NW NW 11-9-4, dry, T.D. 4,716 ft.

Seminole County: Donmar 1 Smith, SE SE NE 29-8-6, pumped 45 bbl., 42 gravity, Hunton 4,360-90 ft., 4-in. 4,460 ft., acid, T.D. 4,619 ft. *Discovery.*

Stanolind-Amerada 1 Tucker, SE NE SW 11-10-7, dry, T.D. 4,489 ft., Wilcox 4,462 ft.

●

## New Field Is Showing In North Louisiana

By R. MARNE SANFORD

SHREVEPORT, La., Dec. 22.—On the immediate south shore of Lake Catahoula in La Salle Parish the Carter Oil 1-D Louisiana Delta, 25-6n-3e, was testing for commercial completion after finding several zones of saturation in the deep Wilcox section in Claiborne Parish of northern Louisiana Union Producing Co. is drilling below 11,176 ft. at its exploratory hole at Lisbon and is even now planning another deep test for the area.

The Catahoula Lake wildcat is located in 25-6n-3e, just south of the lake shore. The saturation was revealed in two side-wall cores taken from 4,294 ft. to 4,304 ft. and from 4,310 ft. to 4,312 ft. The 6-in. casing has been cemented at 4,364 ft. and the program of perforating and squeezing essential for completion in this area has already started.

Meanwhile in Rapides Parish the Marr & Phillips Petroleum 1 Eota Realty Co., 14-4n-3e, a Wilcox discovery well which has been testing for several weeks, is near official completion. Pumping unit has been rigged over the hole which is bottomed at 7,078 ft. and the well has been rated on initial pumping tests at about 80 bbl. free oil daily.

### NORTH LOUISIANA COMPLETIONS

#### Wildcats

Catahoula Parish: C. H. Lyons 1 Hargis, NW NW 18-7n-6e, top Wilcox 3,376 ft., dry at 6,346 ft.

Placid Oil 1 Grant Timber & Mfg. Co., NW SW 21-7n-6e, dry at 6,591 ft. in Wilcox.

Concordia Parish: Harry W. Elliott 1 Brown, NE SW 33-8n-8e, top Wilcox 3,691 ft., Midway 6,465 ft., dry at 6,587 ft.

La Salle Parish: H. L. Hunt 16-F Goodpine, NW SW 11-8n-2e, dry at 4,540 ft. in Wilcox.

Placid Oil 17-F Goodpine, NE SE 2-8n-3e, top Wilcox 2,465 ft., dry at 5,052 ft.

N. H. Wheless-Carter Oil-Phillips Pet. 1-B Louisiana Delta, NE SE 3-5n-3e, top Vicksburg 1,180 ft., Cockfield 1,550 ft., Cook Mountain 2,142 ft., Sparta 2,273 ft., Cane River 2,941 ft., Wilcox 3,034 ft., Midway 5,848 ft., dry at 5,996 ft.

Lincoln Parish: Thomas Richmond 1 Emery, SW SW 8-18n-1w, abandoned location.

#### Fields

Caddo, Caddo Parish: Burnham Drlg. Co. 1-A Thigpen-Herold, SW NE SE 34-22n-16w, dry at 2,515 ft.

L. M. Calhoun, Jr., 1-A Stiles, SW SW SW 33-21n-16w, 30 bbl. oil, T.D. 956 ft.

Magnolia 40 Doan-Thigpen, NW SE 6-20n-15w, 40 bbl. oil, T.D. 1,540 ft.

Pala Oil 2 Jeems Bayou, NE NW 20-20n-15w, 4 bbl. oil, T.D. 2,293 ft.

L. W. Rinamen 1 Muslow, SE NE 32-21n-15w, 25 bbl. oil, T.D. 1,575 ft.

Kelly, Caldwell Parish: Mudge Oil 1 Southern Kraft, NE SW 5-11n-4e, dry at 3,514 ft.

Larto Lake, Catahoula Parish: Phillips 3-B Tensas Delta Ld., NW SE 14-5n-5e, top Wilcox 3,920 ft., dry at 6,010 ft.

GOTKOOL WATER CAN
Come in 1½, 2, 3, 5, 10, 15 and 20-gallon sizes.
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KNOWN throughout the Oil Industry around the world, GOTKOOL Water Cans and Coolers are the practical way to keep drinking water cool for long periods, protected from impurities and always handy to the job.

These containers come in two forms; the standard GOTKOOL Water Can, easily movable, built to withstand the hard wear of constant usage. (Furnished also with push-button faucet at slight additional charge.) The GOTKOOL Water Cooler, built of the same rugged construction as the Water Can comes equipped with a non-leaking push-button faucet and is more adaptable for plant, store and living quarter use. Both have quickly removable tops that fit snugly over the EXTRA LARGE top openings, permitting easy filling.

**See Composite Catalog — Drilling and Producing Equipment Directories**

**Vea el Catálogo Compuesto — Directorios de Equipo de Perforación y Producción**

CONOCIDOS en la industria petrolera del mundo entero, los cubos o baldes de agua y los enfriadores GOTKOOL representan el método práctico de conservar fresca el agua potable durante largos períodos de tiempo, protegida contra impurezas y siempre al alcance inmediato de la mano. Se ofrecen en dos formas: el cubo o balde de ague GOTKOOL normal, fácil de transportar y construido para resistir el desgaste proveniente del uso contínuo. (Se suministra también con grifo de botón de presión, a poco precio adicional.) El enfriador de agua GOTKOOL, igualmente firme en construcción, se suministra provisto de grifo de botón de presión y se adapta idealmente a establecimientos, tiendas y casas. Ambos productos tienen tapas de fácil colocación, que ajustan hermeticamente en las GRANDES aberturas superiores, para facilitar la llenada.

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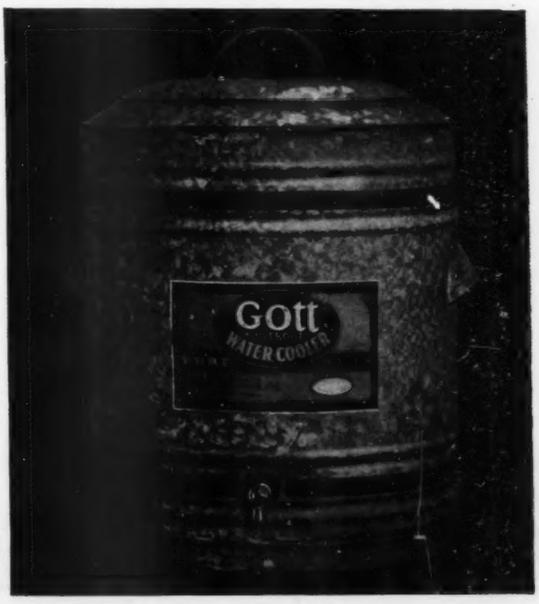


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**Winfield, Kansas, U.S.A.**

Little Creek, La Salle Parish: H. L. Hunt 49-F Goodpine, SE NW 30-9n-2e, 30,000,000 cu. ft. gas, perf. 2,472-78 ft., T.D. 2,712 ft.

Logansport, De Soto Parish: Southern Production Co. 1 Slaid, SW SE 5-11n-15w, 20,000,000 cu. ft. gas, perf. 4,970-80 ft. and 4,986-5,010 ft., T.D. 6,147 ft.

Nebo, La Salle Parish: Graham & Horter 1 Walker, SW NE 38-7n-3e, dry at 4,101 ft.

H. L. Hunt 37-A Goodpine, NE NW 15-7n-3e, 158 bbl. oil and 8 bbl. water, perf. casing 3,458-64 ft., T.D. 4,084 ft.

Placid Oil 2 Federal Ld. Bk., C S½ Lot 2, irregular Sec. 40-7n-3e, 142 bbl. oil and 4 bbl. water, 3,690-3,700 ft., T.D. 4,058 ft.

Olla, La Salle Parish: Placid Oil 119 Louisiana Central, NE SW 8-10n-3e, dry at 2,425 ft.

South Olla, La Salle Parish: Placid Oil 9-B Goodpine, SE NW 27-9n-2e, 80 bbl. oil and 30 bbl. water 2,575-78 ft., T.D. 2,737 ft.

Urania, La Salle Parish: Haynes & Alexander 3 Urania Lbr. Co., SE NW SE 2-9n-1e, dry at 1,505 ft.

### ARKANSAS COMPLETIONS

East Schuler, Union County: Placid Oil 1 Bishop, SE SE 14-18s-17w, 180 bbl., perf. casing 5,599-5,604 ft., T.D. 5,892 ft.

## Second Well in Louisiana Gulf Field Checks High

By F. L. SINGLETON

NEW ORLEANS, La., Dec. 22.—A second producer for the Bastian Bay field, Plaquemines Parish, was apparently assured as Phillips 2 State, located south of the discovery well in 27-20s-29e, was drilling ahead after logging sand with an oil odor. Side-wall cores at intervals from 8,990-9,355 ft. recovered sand and sandy shale with an oil odor, and the well is drilling ahead in shale below 9,795 ft. Correlated with the discovery well which is producing from sand at 9,300 ft., the well ran 20 ft. higher at 6,200 ft., 50 ft. lower at 8,200 ft., and 80 ft. higher at 9,635 ft.

**Two Wildcats Get Shows**

In the Hayes area, Calcasieu Parish, Gulf 2 Calcasieu National Bank, is bottomed at 11,784 ft., and 7-in. casing is scheduled to be cemented on bottom. The well has been showing considerable gas pressure and a test of several sands logged by an electrical survey in the Moss Lake area, has been plugged back from a total depth of 10,000 ft., and the hole will be sidetracked at approximately 3,200 ft. An electrical survey showed a slight "kick" from 9,800 ft. to the total depth, and the drilling mud was cut with gas and salt water. Location is in 4-11s-9w.

**Bayou Blue Flank Opened**

Flank production was opened on the north side of the Bayou Blue dome, Iberville Parish with the completion of Superior Oil Co. of California 19 Schwing Lumber & Shingle Co., which is flowing at the rate of 120 bbl. oil daily through a ⅛-in. choke from perforations at 5,024-31 ft. Tubing pressure was 500 lb. and casing pressure 550 lb. Production heretofore has been confined to the west and east flanks.

### LOUISIANA GULF COAST COMPLETIONS

**Wildcat**

Allen Parish: J. A. Hafner, Jr., 1 Nevills, dry, T.D. 8,014 ft.

**Fields**

Anse La Butte, St. Martin Parish: Stanolind 6 Edmond, old well, old T.D. 6,304 ft., 190 bbl., perf. 6,055-90 ft.

Bosco, Acadia Parish: Superior 1 Iseringhausen, 116 bbl., perf. 8,080-85 ft., T.D. 8,691 ft.

Golden Meadow, La Fourche Parish: Texas 19 Falgout, 227 bbl., T.D. 5,640 ft., P.B. 5,455 ft.

Lake Chicot, St. Martin Parish: Amerada 2 State, 324 bbl., perf. 8,150-75 ft., T.D. 9,500 ft.

La Pice, St. James Parish: Shell 3 Federal Land Bank, dry, T.D. 11,851 ft.

Paradis, St. Charles Parish: Texas 16 L. L. and E. Paradis, 389 bbl., perf. 10,268-10,302 ft., T.D. 10,450 ft.

Potash, Plaquemines Parish: Humble 47 Orleans Levee District, old well, 843 bbl., perf. 8,740-46 ft., T.D. 8,780 ft.

Raceland, La Fourche Parish: Amerada 9 South Coast Corp., 250 bbl., perf. 10,140-50 ft., T.D. 10,260 ft.

Roanoke, Jefferson Davis Parish: Humble 10-B Devilbiss, old well, 183 bbl., perf. 8,805-12 ft., old T.D. 8,050 ft.

New Iberia Parish: Wm. Helis 15 Bolivar, 120 bbl., perf. 4,676-88 ft., T.D. 4,965 ft.

Vinton, Calcasieu Parish: E. H. Robertson 3 Vincent, 135 bbl., perf. 3,016-22 ft., T.D. 3,933 ft.

Ville Platte, Evangeline Parish: Continental 3 Fontenot-Tate, 119 bbl., perf. 10,010-22 ft., T.D. 10,028 ft.

Continental 2 Opelousas-St. Landry-Derouen, old well, 318 bbl., perf. 10,067-90 ft., T.D. 10,380 ft.

West Mermentau, Acadia Parish: H. M. Taylor 1 Acadia Development, old well, 87 bbl. distillate, T.D. 10,348 ft., P.B. 9,134 ft.

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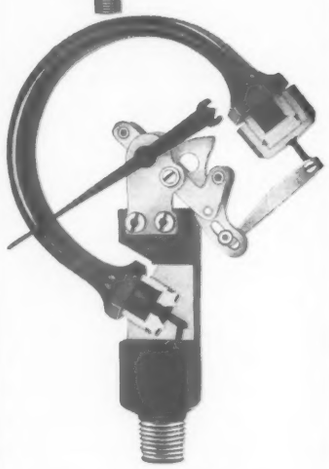

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# MARSH GAUGES

JAS. P. MARSH CORPORATION, 2065 SOUTHPORT AVE., CHICAGO, ILL.


## Development Program Planned For Chapel Hill In East Texas

By D. H. STORMONT

DALLAS, Tex., Dec. 22.—An expanding developmental program for the big Chapel Hill field of Smith County, second most active area in the East Texas district, was outlined by the Sinclair Prairie Oil Co. The firm has staked location for 10 new tests in the field and has already obtained permission to drill six of them. Sinclair Prairie has one Pettit lime oil producer on the southwest flank of the structure and is drilling a second test on the north end of the pool. The company has approximately 1,500 acres of leases in the area, in the north and on the southwest flank, and has several required offsets. Most of the drilling, for the present, will be confined to the drilling of these offsets.

Chapel Hill produces both gas distillate and oil. The gas distillate is obtained from the Rodessa series of the Glen Rose, the Paluxy sand and the Pettit lime. Oil is found only in the Pettit lime.

### EASTERN TEXAS COMPLETIONS

**Wildcats**

Smith County: B. F. Phillips 1 fee, Oscar Hawkins Sur., 2½ mi. SE of Friendship, dry at 5,791 ft., Austin 3.585 ft., Woodbine 3,801 ft.

**East Texas Field**

(1-hr. gage)

Kilgore, Gregg County: J. W. Russell 5-A R. Lacy, N. Srews Sur., 88 bbl., Austin 3,450 ft., pay 3,508-15 ft.

Longview, Gregg County: Wrather & Robins 2 Alexander, D. Sanches Sur., 60 bbl., Austin 3,490 ft., pay 3,555-85 ft.

**Other Fields**

East Long Lake, Anderson County: Tex Harvey 5 S. E. J. Cartmel, E. Ewing Sur., 95 bbl., pay 5,401-11 ft.

Hawkins, Wood County: Humble 4 G. W. Atkins, J. P. Moseley Sur., 97 bbl. in 6 hr., Woodbine, pay 4,678 ft., T.D. 4,868 ft.

Humble 1-B J. A. Brown, A. N. McKnight Sur., dry at 4,980 ft.

Humble 3-B L. A. Bryan, M. A. Esparcia Sur., 279 bbl. in 18 hr., Woodbine, pay 4,740-4,800 ft., T.D. 4,970 ft.

Humble 2 Mayfield, G. Brewer Sur., 91 bbl. in 8 hr., pay 4,827-33 ft., T.D. 4,887 ft.
Humble 3-A E. W. Moore, J. Pollock Sur., 195 bbl. in 18 hr., Woodbine, pay 4,482-4,618 ft., T.D. 4,862 ft.
Humble 1-C W. S. Shamburger, J. Pollock Sur., 92 bbl. in 6 hr., Woodbine, pay 4,762-4,882 ft., T.D. 4,916 ft.
Stanolind 4 C. C. Miller, J. P. Moseley Sur., 93 bbl. in 8 hr., Woodbine, pay 4,476-4,661 ft., T.D. 4,877 ft.
Texas 2 A. D. Snider, J. P. Moseley Sur., 105 bbl. in 6 hr., Woodbine, pay 4,662-4,782 ft., T.D. 4,847 ft.
Long Lake, Anderson County: S. H. Killingsworth 2 H. A. Tull, S. Sanches Sur., 115,000,000 cu. ft. gas, pay 5,287-98 ft.
Opelika, Henderson County: Lone Star and Shamrock 1 Maud Saylors, J. M. Eakins Sur., 200,000,000 cu. ft. gas, pay 8,400-14 ft.

●

## Burbank Sand Pool Is Opened In Eastern Kansas

By ROBERT INGRAM

A NEW Burbank sand pool was opened in Cowley County last week on what appeared to be an extension of the Sherwood-David shoestring. It was opened by Trees Oil Co. 1 Deichman, NW SW 24-31-4, which flowed at the rate of 200 bbl. a day from sand topped at 2,835 ft. The sand was penetrated 1 ft., and the well flowed 40 bbl. in 6 hours. It was to be shot and tested again.

In Barton County, the new Pawnee Rock Northeast pool had a new producer in Helmerich & Payne 1 Smith, NW SW 17-20-15w, which was flowing 40-50 bbl. of oil an hour by heads while testing Arbuckle dolomite. The well was bottomed at a plug-back depth of 3,831 ft. It is a south offset to the discovery.

### Northern Pools Growing

In the northernmost producing area, new wells were being added to the Dayton pool in Phillips County and the Morel pool of Graham County. In the Dayton pool, 16 miles northeast of the Hewitt pool, Carter Oil Co. 1 Dusin, NE SE 35-2-19w, drew a swabbing potential of 78 bbl. from Lansing-Kansas City lime at 3,344 ft., and was the third well in the field.

The Morel pool apparently had two new producers, bringing the total to eight. Cities Service 1 Morel, NE NE 22-9-21w, offsetting the discovery, was to take a potential test after getting a 3,000-ft. fill-up from Arbuckle dolomite penetrated to 3,777 ft. Continental Oil Co. 2 Trexler, NW SW NW 15-9-21w, had a 450-ft. fill-up from the Arbuckle drilled to a total depth of 3,690 ft.

### KANSAS COMPLETIONS

#### Wildcats

Cowley County: Sinclair Prairie 1 Collinson, SW SW NW 31-34-3e, dry, T.D. 3,558 ft., Topeka 1,630 ft., Stalnaker 2,330 ft., Layton 2,773 ft., Bartlesville sand 3,474 ft.
Harvey County: Alf Landon 1 Gray, NW NW NE 15-22-2e, dry, T.D. 3,083 ft., Fort Riley 425 ft., Lansing 2,120 ft., Mississippi 2,733 ft., Viola 3,079 ft.
Leavenworth County: McKinney & Miller 1 Roberts, N½ NE NE 7-11-21e, dry, T.D. 1,441 ft., Bartlesville 1,288 ft., Mississippi 1,395 ft.
Norton County: Helmerich & Payne and Phillips 1 Le Count, NE SE 1-2s-25w, dry, T.D. 3,725½ ft., anhydrite 2,000 ft., Topeka 3,245 ft., Lansing 3,390 ft., granite 3,723 ft.
Pawnee County: Skelly and Atlantic 1 Yeager, W½ SW SW 32-22-15w, dry, T.D. 4,025 ft., Lansing 3,555 ft., Viola 3,881 ft., Simpson sand 3,980 ft., Arbuckle 4,000 ft., show oil.
Reno County: Leader Oil and Zephyr Drilling 1 Tonn, SW SW SW 11-23-10w, potential 3,000 bbl., flowing, Viola 3,757 ft., 7-in. 3,760 ft., T.D. 3,762 ft. *Discovery.*
Rocket Drilling 1 Soper, N½ NE NW 30-25-4w, pumped 165 bbl. oil in 8 hr., potential 497 bbl., 36.8 gravity, Viola 3,981-86 ft., 4½-in. 3,981 ft., acid, T.D. 3,986 ft., tops, Fort Riley 1,010 ft., Topeka 2,205 ft., Lansing 2,912 ft. *Discovery.*
Rice County: Nelson Drilling 1 Skiles, S½ SW SW 8-18-8w, dry, T.D. 3,015 ft., Topeka 2,490 ft., Lansing 2,878 ft.
Ingling & Parker 1 Jeter, E½ SE SE 3-21-9w, dry, T.D. 3,355 ft., anhydrite 240 ft., Topeka 2,461 ft., Lansing 2,924 ft., Viola 3,297 ft., Simpson sand 3,349½ ft.

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## Flank Pay Showing at Big Hill Dome, Texas Gulf Coast

By NEIL WILLIAMS

HOUSTON, Tex., Dec. 22.—Although still in the testing stage, Stanolind 1 George D. Anderson was showing promise of opening production from a deep sand on the north flank of the Big Hill dome, Jefferson County. With the hole bottomed at 9,500 ft., the well is testing through perforated liner at 8,705-20 ft., and on a 15-hour test flowing through various chokes it flowed an estimated 95 gallons of oil and an estimated 15,000,000 cu. ft. of gas. Tubing pressure ranged from 3,375 lb. on a 9/64-in. choke to 4,375 lb. on a 7/64-in. choke. Whether the well will be completed at the present depth or be plugged back and completed in sands up the hole was not announced.

### Two Wildcats Testing

Two Wilcox tests located in Newton and Trinity counties reported shows of oil and gas, and casing may be cemented for testing. Four miles east of Kirbyville, Newton County, H. C. Cockburn 1 Texas A. & M. College is reported to have topped the Wilcox at 8,600 ft., and sand with an oil and gas show is said to have been logged by an electrical survey at intervals from 8,732-52 ft. Total depth is 8,806 ft., and the well is expected to be drilled deeper. Location is in the J. T. Lewis Survey.

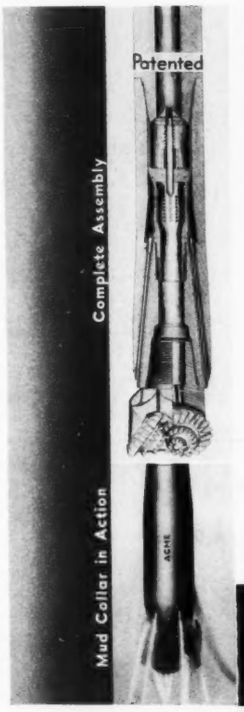
### TEXAS GULF COAST COMPLETIONS

#### Wildcats

Jefferson County: W. P. Luse 1 Kemp, dry, T.D. 8,615 ft.
Jackson County: Rowan Drilling Co. 1 McCulloch, dry, T.D. 5,751 ft.

#### Fields

Alta Loma, Galveston County: Stanolind 5 J. A. Hulen, 376 bbl., top sand 9,168 ft., T.D. 9,175 ft.
Barbers Hill, Chambers County: Texas Gulf Producing Co. 4 Fitzgerald, 389 bbl., perf. 4,948-64 ft., T.D. 5,604 ft.
Blue Ridge, Fort Bend County: Mills Bennett Production Co. 19 Lusher, 167 bbl., perf. 2,765-75 ft., T.D. 3,370 ft.
Clodine, Fort Bend County: Providence 2 Hatfield, 150 bbl., perf. 7,498-7,501 ft., T.D. 7,538 ft.
Dyersdale, Harris County: Jack Frazier 1 Clauder, 177 bbl., perf. 4,048-74 ft., T.D. 4,078 ft.
Fig Ridge, Chambers County: Sun 1 McCarthy, 600 bbl., perf. 8,515-29 ft., T.D. 8,584 ft.
Goodrich, Polk County: Pan American 2-B Texas Long Leaf Lbr. Co., 79 bbl. oil and 15 bbl. salt water, perf. 4,032-38 ft., T.D. 4,080 ft.
Hull, Liberty County: Texas 3 Wickliff, 312 bbl., T.D. 6,201 ft., P.B. 5,875 ft.
Lolita, Jackson County: Cox & Hamon 1 I. N. Mitchell, 48 bbl., perf. 5,288-92 ft., T.D. 5,948 ft.
Manvel, Brazoria County: Texas 6-B Holenwag, 72 bbl., perf. 4,051-55 ft., T.D. 4,060 ft.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North LaWard, Jackson County: Magnolia 8 W. H. Gordon, 66 bbl., perf. 5,216-19 ft., T.D. 5,225 ft.
North Markham, Jackson County: Ohio 13 J. C. Carlson, 231 bbl., perf. 7,692-7,722 ft., T.D. 8,125 ft.
Stowell, Jefferson County: Glenn H. McCarthy 1 Crawford, 483 bbl., perf. 8,850-80 ft., T.D. 9,313 ft.
Van Vleck, Matagorda County: Skelly 26-B Cobb, 182 bbl., perf. 8,503-9 ft., T.D. 8,513 ft.
West Columbia, Brazoria County: Texas 44 Abrams, 346 bbl., perf. 5,640-5,740 ft., T.D. 5,898 ft.
West Ganado, Jackson County: Texas 2 L. Kuretsch, 109 bbl., casing 4,755-74 ft., T.D. 5,500 ft.
West Ranch, Jackson County: Humble 9 Vanderbilt-State, 168 bbl., sand 5,782-86 ft.
Magnolia 133-A West ranch, old well, 39,000,000 cu. ft. gas open flow, T.D. 5,106 ft.

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## Drilling Boom Under Way At New Illinois Pool

By STAFF CORRESPONDENT

MATTOON, Ill., Dec. 22.—Oil-field activity declined in the Illinois basin last week but it was generally believed by operators to be due to the approaching holiday season and renewed exploration was expected after the first of the year.

The new pool opened 2 weeks ago about 1½ miles west of the Clay City Consolidated pool is already the scene of a small drilling boom and has prospects of soon becoming one of the most active areas in the state. The second well in the field has been completed as an excellent producer. It is Pure 1-A L. A. Pearce, S½ SW NE 10-2n-7e, which is flowing natural. Although production figures have not been revealed, the well is unofficially reported to be as large as the discovery well which was initialed at 3,710 bbl. natural in 24 hours and is now making about 70 bbl. a day. In the area surrounding the discovery well, materials are being moved in for two additional tests while six other wells are already drilling below 1,000 ft.

### Wildcat Finds Saturated McClosky

A Richland County wildcat 1½ miles south of Olney caused excitement when McClosky saturation was found at 3,146-57 ft. and 3,162 ft. The test is Benedum-Trees 1 L. J. Powell, E½ NW SE 10-3n-10e. Casing has been set at total depth of 3,182 ft. and will be perforated opposite the saturated zones. On a drill-stem test before casing was set, the well showed 180 ft. of oil, 45 ft. of oil-cut mud and 540 ft. of salt water.

### ILLINOIS COMPLETIONS

#### Wildcats

Gallatin County: Carter 1 H. D. Whipple, SW SE SE 21-7s-8e, dry at 3,120 ft., lower Kincaid 1,798 ft., Menard 2,038 ft., Waltersburg 2,128 ft., Tar Springs 2,213 ft., Glen Dean 2,293 ft., Barlow 2,564 ft., Cypress sand 2,596 ft., Benoist 2,742 ft., Aux Vases 2,893 ft., Ste. Genevieve 2,934 ft., St. Louis 3,111 ft.

Jefferson County: Mid-Sun 1 Adams, N½ NE NW 14-2s-3e, dry at 2,943 ft., base Pennsylvanian 1,877 ft., Menard 2,023 ft., Waltersburg 2,072 ft., Tar Springs sand 2,172 ft., Glen Dean 2,230 ft., Hardinsburg 2,300 ft., Golconda 2,350 ft., Barlow 2,446 ft., Cypress 2,451 ft., Paint Creek 2,610 ft., Benoist 2,658 ft., Renault 2,702 ft., Aux Vases 2,720 ft., Ste. Genevieve 2,756 ft., St. Louis 2,939 ft.

Lawrence County: Great Central et al 1 Patton, NE NW NW 34-3n-12w, pumped 21 bbl., McClosky 1,895-96 ft., T.D. 2,201 ft.

McDonough County: Charles Measly 1 Bly, NW NW NW 22-4n-4w, dry at 845 ft., Burlington 70 ft., Kinderhook 170 ft., Maquoketa 440 ft., Trenton 600 ft., St. Peter 843 ft.

Saline County: Hal. Compton 1 Ray Durham, SE SE SE 30-7s-6e, dry at 3,389 ft., lower Kincaid 1,953 ft., Menard 2,208 ft., Vienna 2,336 ft., Glen Dean 2,440 ft., Hardinsburg 2,502 ft., Golconda 2,668 ft., Barlow 2,753 ft., Cypress sand 2,810 ft., Renault 3,034 ft., lower Renault 3,082 ft., Aux Vases 3,099 ft., Ste. Genevieve 3,150 ft., Fredonia 3,223 ft., McClosky 3,298 ft.

Wabash County: H. Fotiades 1 H. A. Fox, SW NW NE 27-1n-12w, dry at 2,314 ft., Vienna 1,675 ft., Tar Springs 1,706 ft., Glen Dean 1,770 ft., Golconda 1,872 ft., Barlow 1,962 ft., Cypress sand 1,980 ft., Renault 2,174 ft., Aux Vases 2,227 ft., Ste. Genevieve 2,267 ft.

White County: Reese et al 1 Schumaker, SW NW SW 23-4s-9e, dry at 3,350 ft., Menard 2,413 ft., Waltersburg 2,499 ft., Vienna 2,545 ft., Tar Springs 2,549 ft., Glen Dean 2,632 ft., Hardinsburg sand 2,716 ft., Barlow 2,868 ft., Cypress 2,968 ft., Paint Creek 3,002 ft., Benoist 3,052 ft., Renault 3,106 ft., Aux Vases 3,173 ft., Ste. Genevieve 3,173 ft., McClosky 3,252 ft.

## Wildcatting Increases In West Texas; Millar Well Improved

By TOM BARBER

MIDLAND, Tex., Dec. 22.—A 5,000-gal. acid treatment of the lower pay zone at Gulf and L. H. Wentz Millar apparently has boosted the output of the prospective discovery. No. 2 Millar found additional oil and gas shows last week when it was deepened from 4,363 ft. to 4,383 ft. Before acid treatment in the lower zone, the well flowed 73 bbl. of oil in 24 hours through tubing. After acid treatment, with tubing plugged, it flowed 464 bbl. of oil through casing, 333 bbl. of which was oil load. On a later gage the well flowed 161 bbl. of oil, cut, 1 per cent with b.s., in 24 hours through 7-in. casing; gas volume of 3,519,360 cu. ft. declined to 1,989,170 cu. ft. daily, and on the later gage measured 994,000 cu. ft.

No. 2 Millar is located in the NW NW SE Section 43, Block 11, H.&G.N. Survey, in the northeastern part of Pecos County. It is about 4½ miles south of Girvin and 8½ miles northwest of the Taylor-Link pool.

### Sand Hills Extended

A ½-mile southeast extension for the Sand Hills Permian field of western Crane County was completed to open new territory to exploration. The extension well is Gulf 2-BX Tubb, Section 29, Block 32, P.S.L. Survey, which flowed through perforations in 7-in. casing at 4,300-4,400 ft. to rate an estimated daily potential of 343 bbl. of 37.1-gravity oil, based on the last 4 hours of a 6-hour gage. The well was treated with 4,000 gal. of acid in the Tubb pay of the Permian lime.

No. 2-BX Tubb was drilled to the Ellenburger, Lower Ordovician, lime at 5,788 ft. where it encountered sulfur water. Operator plugged back to 5,600 ft., set 2-in. tubing at 4,415 ft. and with packer at 4,411 ft. perforated casing opposite the producing horizon.

### SOUTHERN WEST TEXAS COMPLETIONS

(24-hr. rating based on last 3 hr. of 6-hr. gage)

#### Fields

Abell, Pecos County: Sinclair 2 Daley, elev. 2,391 ft., 1,419 bbl., Simpson 4,755 ft., Tulip Creek 5,025 ft., pay 5,374-5,420 ft.

Crockett, Crockett County: Gilcrease 1-B University, elev. 2,398 ft., 20 bbl. oil and 10 bbl. water, pumping, 1,583-1,661 ft.
O. R. Tipps 2 University, elev. 2,331 ft., 77 bbl., 1,453-55 ft.
O. R. Tipps 5 University, elev. 2,323 ft., 283 bbl., 1,403-40 ft., T.D. 1,445 ft.

Estes, Ward County: Gulf 153 Estes, elev. 2,516 ft., 618 bbl., 2,529-40 ft.

Foster, Ector County: C. O. Davis 3 Judkins, elev. 2,954 ft., 13 bbl., 4,250-4,385 ft.

Johnson, Ector County: Cities Service 5-A Johnson, elev. 2,975 ft., 282 bbl., 4,107-4,217 ft.
George P. Livermore 1-45 Johnson, elev. 3,000 ft., 972 bbl., 4,046-4,136 ft.
T. P. Coal 8 Johnson, elev. 2,968 ft., 308 bbl., pumping, 4,148-4,256 ft.

Lehn, Pecos County: Burk Royalty 6-C Sullivan, elev. 2,440 ft., 168 bbl., 1,698-1,732 ft.
Sanwan Oil Co. 5 Boren, elev. 2,442 ft., 51 bbl., 1,696-1,725 ft.
Skelly 1-B M. I. Masterson, elev. 2,442 ft., 8 bbl., pumping, 1,635-1,740 ft.

McCamey, Upton County: T. P. Coal 32-A Lane, elev. 2,684 ft., 72 bbl., pumping, 2,273-78 ft., deepened from 2,214 ft.

McElroy, Crane County: Gulf 261 McElroy, elev. 2,602 ft., 433 bbl. oil and 95 bbl. water, 2,690-2,885 ft.

Noelke, Crockett County: M. & M. 1-F Bouscaren, elev. 2,883 ft., 40,000,000 cu. ft. gas, pay 1,570-75 ft.

North Ward, Ward County: Gulf 193 O'Brien, elev. 2,670 ft., 1,128 bbl., 2,539-2,772 ft.

Sand Hills (Permian), Crane County: Gulf 33 Waddell, elev. 2,690 ft., 6,044 bbl., 4,571-4,631 ft.
Gulf 34 Waddell, elev. 2,648 ft., 2,765 bbl., 4,505-4,603 ft.
Humble 65 Tubb, elev. 2,585 ft., dry at 4,672 ft.
Humble 2-BX Tubb, elev. 2,553 ft., 343 bbl., ½-in. choke, Ellenburger 5,775 ft., pay 4,300-5,600 ft., T.D. 5,788 ft.

Waddell, Crane County: Gulf 49 Waddell, elev. 2,702 ft., 362 bbl., T.D. 3,370 ft.

White & Baker, Pecos County: Lewis & Engle 1-C White & Baker, elev. 3,039 ft., 35 bbl., 2,083-2,103 ft.

### Two North Outposts Staked

As hope for production from a wildcat in Hockley County dimmed and while operator at a Gaines County wildcat continued to test, two important wildcat locations were announced in the northern West Texas district. Expecting to spud within the next 2 weeks, Henry A. Roach and L. B. Benton staked location for 1 J. D. Moxley in the SW SW Section 64, Block 20, H.E.&W.T. Survey in the southwest corner of Lubbock County, to drill to the lower Permian at about 6,000 ft.

Dunigan Brothers & Brahaney 1 Alice Henard, contracted to 5,500 ft., was located 660 ft. out of the NE cor. of Section 367, Block D, J. H. Gibson Survey. It is ⅞ mile northeast of Bahan & Rhodes 1 Henard.


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which was abandoned in August 1936 after encountering two promising oil shows.

The possibility of developing production at Stanolind 1 Williams, Hockley County wildcat, was lessened when a core from 4,760-96 ft. recovered brown dolomite with strong sulfur water. Earlier in the week, the wildcat had found a softening of the lime at 4,724 ft. and started coring at that depth. A core taken from 4,724-42 ft. returned lime with fair porosity and stain but a test at 4,742 ft. showed only mud. A second core from 4,742-60 ft. recovered lime with porosity carrying an indication of water. At last report, the wildcat was shut down at 4,796 ft. for orders. No. 1 Williams is in Labor 21, League 707, State Capitol Lands Survey.

In Gaines County, the wildcat prospect being drilled by Amerada at 1 Ruth Hudson, Section 60, Block AX, P.S.L. Survey, is still in the testing stage. Operator was continuing to swab in an attempt to make the test kick off from a total depth of 5,016 ft. In the last 24-hour swabbing period reported, 1 Hudson recovered 8.4 bbl. of oil and 4 bbl. of water. Fluid level is 220 ft. off bottom. No. 1 Hudson is 3 miles west of the Wasson field.

### NORTHERN WEST TEXAS COMPLETIONS

(24-hr. rating based on last 3 hr. of 6-hr. gage)

**Wildcats**

Terry County: American Dev. Co. 1 W. T. Hufnall, elev. 3,528 ft., dry at 5,435 ft.

**Fields**

Emma, Andrews County: Sinclair 13 Cowden, elev. 3,155 ft., 1,049 bbl., 4,160-4,250 ft.

Sharon Ridge, Mitchell County: F. W. Merrick 2 Mills, elev. 2,184 ft., 199 bbl., pumping, 1,554-1,725 ft.

Slaughter, Cochran County: Anderson & Prichard 9 Woodley, elev. 3,694 ft., 916 bbl., 4,923-76 ft.

Honolulu 12-4 Igoe & Smith, elev. 3,677 ft., 617 bbl. oil and 7 per cent water, 5,041 ft.

Honolulu 20-8 Igoe & Smith, elev. 3,664 ft., 1,084 bbl., 4,970-5,045 ft.

Honolulu 22-B Igoe & Smith, elev. 3,655 ft., 1,543 bbl., 4,950-5,030 ft.

Honolulu 23-4 Igoe & Smith, elev. 3,669 ft., 884 bbl., 4,935-5,020 ft.

Magnolia 19 Woodley, elev. 3,701 ft., 1,013 bbl., 4,957-5,000 ft.

T. P. Coal 1 Mallett, elev. 3,646 ft., 201 bbl., 4,975-5,045 ft.

Slaughter, Hockley County: Falcon 1 T. E. Grant, elev. 3,594 ft., 559 bbl., 4,923-51 ft.

Magnolia 10-E Mallett, elev. 3,591 ft., 1,074 bbl., 4,990-5,020 ft.

Magnolia 7-F Mallett, elev. 3,603 ft., 1,054 bbl., 4,965-5,030 ft.

Magnolia 14-G Mallett, elev. 3,621 ft., 1,483 bbl., 4,970-5,020 ft.

Skelly 5 Lincoln, elev. 3,578 ft., 1,144 bbl., 4,942-5,000 ft.

Stanolind 4 Martin, elev. 3,584 ft., 230 bbl., 4,950 ft.

Texas 4 Neal, elev. 3,551 ft., 527 bbl. oil and 2 per cent water, 4,945-5,030 ft.

Texas 5 Neal, elev. 3,541 ft., 2,081 bbl., 4,920-5,011 ft.

Texas 3-C Mallett, elev. 3,600 ft., 1,358 bbl. oil and 4 per cent water, 4,985-5,030 ft.

Texas 19-B Mallett, elev. 3,590 ft., 798 bbl., 4,960-5,020 ft.

Texas 62 Slaughter, elev. 3,579 ft., 1,540 bbl., 4,958-5,014 ft.

Texas 64 Slaughter, elev. 3,567 ft., 1,474 bbl., 4,945-5,017 ft.

Texas 65 Slaughter, elev. 3,549 ft., 1,424 bbl., 4,935-5,019 ft.

Texas 69 Slaughter, elev. 3,535 ft., 1,926 bbl., 4,880-5,010 ft.

Wasson, Gaines County: Yeager & Armstrong 1 Ludsay, elev. 3,338 ft., 531 bbl., 5,170-5,255 ft.

Wasson, Yoakum County: Humble 15 Randall, elev. 3,637 ft., 494 bbl., 5,005-82 ft., T.D. 5,098 ft.

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## New Oil Field Is Showing In Southeast Michigan

By OTTO C. PRESSPRICH

SAGINAW, Mich., Dec. 22.—Extension of the Reed City (Lincoln Township, Osceola County) oil field into adjoining Pinora Township was indicated last week and, in addition, it appeared that a new natural gas field may have been discovered in Osceola Township. Another promising test, a wildcat well drilled in Clinton County, was pumping a small quantity of oil and there was a possibility that development in southeastern Michigan may open up if an oil and gas show noted in an Oakland County wildcat can be developed commercially.

Principally because of a progressive tightening of withdrawal allowables from wells in the Reed City field, Michigan oil production declined about 165,000 bbl. in November, a drop of 2,485 bbl. a day to 55,931 bbl. daily average.

The well indicating extension for the Reed City field is the Rose & Swanson 2 Pfuhl, in Section 25 of Pinora Township, on the west end of the pool. First estimates were that the well would produce up to 1,500 bbl. a day. Little success attended previous efforts to find big wells over the Lincoln Township line. Operators in the Reed City section expect slackening of development there shortly, however, unless major extensions to the field result from present tests. They estimate that about 75 locations remain undrilled within the proven field.

Three more of the fair-size producers in Allegan County's Hopkins field and another producer in Bloomingdale, of Van Buren were completed in the southwestern part of the state while in the central area, of interest in the Buckeye sector of Gladwin County was noted as T. F. Caldwell 1 Emmeott, in Section 21,

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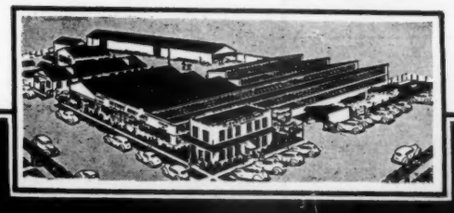

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Hay Township, was being completed as a Dundee well and was said to be flowing better than 300 bbl. a day. The well is south and east of the old Buckeye field. A Gladwin wildcat, McClanahan & Bagwell 1 State, in Sheridan Township, failed and Sun Oil Co. was testing a fair pay from 1 Holycross, in Section 26, of Beaverton.

**MICHIGAN COMPLETIONS**

**Osceola County**

Lincoln Township: Ohio Oil Co. 2 Heilman, C N½ SW SE 19-18n-10w, 6,600 bbl., T.D. 3,606 ft.
Pure Oil Co. 3 Brock, C N½ SW SW Sec. 20, 13,848 bbl., T.D. 3,630 ft.
Ohio Oil Co. 1 Riggs, C N½ SE NE Sec. 19, 2,784 bbl., T.D. 3,599 ft.
C. L. Maguire, Inc., 2 Williams, C SW SE Sec. 31, 845 bbl., T.D. 2,927 ft., Traverse limestone.
Gulf Refining Co. 1 McIntire, C S½ SW SE Sec. 32, T.D. 420 ft., location abandoned.
Osceola Township: Taggart Bros. Co. 1 Wurth, C S½ NE SE 22-18n-8w, wildcat, 388,000 cu. ft. gas, T.D. 1,467 ft.

**Roscommon County**

Roscommon Township: Freeman Oil Co. A-3 State, C S½ NW SW 34-21n-3w, 1,200 bbl., T.D. 3,362 ft.
Freeman Oil Co. A-4 State, C S½ NE SW Sec. 34, 1,200 bbl., T.D. 3,423 ft.

●

## Southwest Texas Development Centers on Agua Dulce Area

By F. L. SINGLETON

CORPUS CHRISTI, Tex., Dec. 22.—Increased development along the west flank of the Agua Dulce-Stratton structure is anticipated as another important extension to oil production was recorded. The extension was made by Sam E. Wilson and Gulf Plains Corp. 1 San Antonio Joint Stock Land Bank, about 3 miles west of the field in the A. Longorio grant. While the well is drilling ahead in search of production in the three other known sands, a drill-stem test in the "Bertram" sand recovered pipe-line oil. Sand showing gas was cored at intervals from 5,615-6,158 ft., and oil sand was cored at 6,240-89 ft. A 6-minute drill-stem test at 6,274-89 ft. tested 45 lb. working pressure and recovered 350 ft. of pipe-line oil. Additional sand was cored at 6,289-6,304 ft., and the well is coring ahead in search of deeper production in the three sands originally established on the east flank, and referred to as the Sellers, lower Sellers, and Wardner sands.

Extension of oil production into Jim Wells County marks the field as a three-county pool, and the extent of production in this direction is still undetermined. Flank production was opened on this particular side of the structure several months ago by the operators' 1 Rivers, located in Nueces County, about 2 miles west of production. Development thus far indicates that the producing sands originally found on the east and southeast sides, flank the west side of the structure as well, and can be tied in with one another without much difficulty.

Increased activity for the county was also reported as another gas-distillate field was opened and locations for several interesting wells were announced. Three miles southeast of Orange Grove, and 1 mile southwest of production, Rand Morgan 1-H fee, perforated casing at 3,783-88 ft., and is flowing at the rate of 20 to 25 bbl. of 56-gravity distillate per day through a 9/64-in. choke. Tubing pressure was 650 lb., and casing pressure 840 lb. Total depth of the well is 5,810 ft., and 5½-in. casing was cemented at 5,206 ft.

New wildcat activity was reported 4 miles southwest of the Ben Bolt field where Bridwell Oil Co. is preparing to spud 2 J. P. Blake, Jr., a 4,500-ft. test located in the La Trinidad grant, while north of the Alfred field, H. J. Mosser staked location for 1 fee in the Sidney Sherman Survey 25, a 5,500-ft. Frio-Vicksburg test. In the meantime, Shell Oil Co., Inc., is preparing to drill an outpost test in the Von Blucher area in the southern part of county where location was made for 1 Seeligson, in the Willis Millican Survey. Along this same trend, but located in Brooks County, Sun Oil Co. is moving in material for 2 J. D. Cage, a 6,500-ft. test located 12 miles southwest of the town of Falfurrias in the Garcia Survey.

**SOUTHWEST TEXAS COMPLETIONS**

**Wildcat**

Refugio County: Hewitt & Dougherty 1-C Rooke, dry, T.D. 7,008 ft.
Live Oak County: A. R. Pohler 3 Turner, dry, T.D. 907 ft.
Starr County: Magnolia 2 Hinojosa, dry, T.D. 2,982 ft.
O. W. Woods 1 A. K. Bass, dry, T.D. 2,008 ft.
Bexar County: R. C. Standley et al 1 Brooks, dry, T.D. 1,220 ft.
W. S. Hill 1 G. A. Baker, dry, T.D. 1,847 ft.

●

## Chestnut Ridge Wildcats Lead Appalachian Field Work

By STAFF CORRESPONDENT

PITTSBURGH, Pa., Dec. 22.—In South Huntington Township, Fayette County, Peoples Natural Gas Co. was drilling at 6,943 ft. on the Jacobs Creek Oil Co. lease on the Fayette anticline. . . . On Chestnut Ridge, South Union Township, Fayette County, New Penn Development Co., William E. Snee et al were drilling at 4,850 ft. in the 4 Heyn. In the test on the Kirby estate they were drilling by the tools at 6,696 ft., and at the Carrothers test they were drilling out cement at 5,301 ft. The Greensboro Gas Co. is drilling at 7,064 ft. in its well on the Barton estate. . . . In Richhill Township, Greene County, the Natural Gas Co. of West Virginia was drilling at 6,488 ft. in the test on the Andrew Workman farm.

**SOUTHWEST PENNSYLVANIA COMPLETIONS**

Kittanning Township: T. W. Phillips 1 Lanning, 47,000 cu. ft. gas, Hundred-foot sand, T.D. 3,460 ft.
Clarion County, Porter Township: Pennsylvania Fuel 5 George, 90,000 cu. ft. gas, Hundred-foot sand, T.D. 2,428 ft.
Greene County, Jackson Township: Manufacturer's 3 Woods, 33,000 cu. ft. gas, Gordon sand 3,124 ft., T.D. 3,481 ft.
Westmoreland County, Allegheny Township: Peoples 1 Schaffer, 10,000 cu. ft. gas, Speechley sand, T.D. 3,810 ft.

**WEST VIRGINIA COMPLETIONS**

Boone County, Scott district: Owens Illinois 39 Cassingham, 75,000 cu. ft. gas, Big lime 1,850 ft., T.D. 2,570 ft.
Calhoun County: Sherman district: South Penn 8 Sharp, 10 bbl., Big Injun, T.D. 2,124 ft.
Washington district: Hope 8573 Moss, 275,000 cu. ft. gas after shot, Big Injun 1,762 ft., T.D. 1,829 ft.
Godfrey L. Cabot 2 Parsons, 660,000 cu. ft. gas after shot, Big Injun, T.D. 1,945 ft.
Clay County, Buffalo district: Pittsburgh & West Virginia 7793 Elk River, 492,000 cu. ft. gas after shot, Big Injun, T.D. 2,169 ft.
Doddridge County, West Union district: Edmund Tate 1 Mary Jones, 100,000 cu. ft. gas, Big Injun, T.D. 1,755 ft.
Gilmer County, De Kalb district: Hope 8576 Gainer, 100,000 cu. ft. gas, Big Injun, T.D. 2,040 ft.
Lincoln County, Jefferson district: Mud River Gas 1 Elizabeth Adkins, old well, old T.D. 2,240 ft., 189,000 cu. ft. gas, T.D. 3,600 ft.
Bulger Gas 1 A. L. Mullins, old well, old T.D. 2,170 ft., 84,000 cu. ft. gas, T.D. 3,602 ft.


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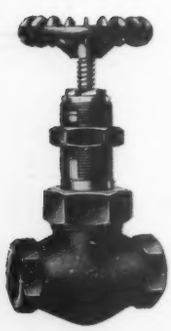

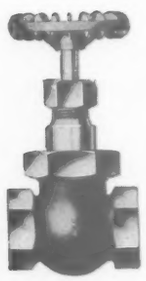

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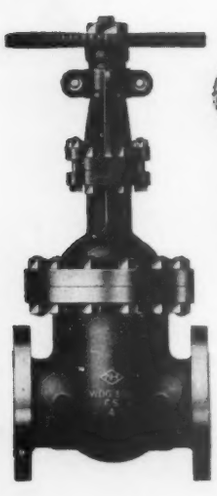

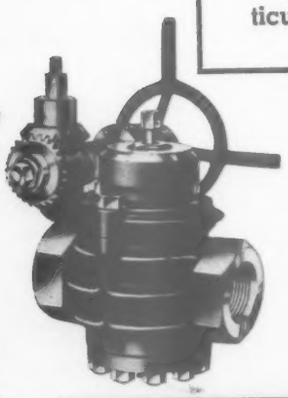

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United 5057 Lovejoy, 133,000 cu. ft. gas, Brown shale, T.D. 3,526 ft.

Putnam County, Teays Valley district: Teays Valley 1 Ivan Davis, dry, T.D. 2,468 ft.

Ritchie County, Grant district: McDonough 3 Mason, dry, Maxon, T.D. 1,410 ft.

Rinehart 11 Moore, dry, Salt sand, T.D. 1,570 ft.

Murphy district: South Penn 1 Eliz Kemp, 650,000 cu. ft. gas, Big Injun, T.D. 2,057 ft.

Watson 1 Cox, 189,000 cu. ft. gas, Berea, T.D. 2,265 ft.

●

## Montana Gas Field May Get Deep Test to Devonian

By T. R. INGRAM

DENVER, Colo., Dec. 22.—Gas wells took precedence over oil-well completions in the Rocky Mountain area last week. There were 10 in the Montana fields. Six of these were in the Bowdoin gas field in Valley and Phillips counties, where the Montana-Dakota Utilities Co. has been conducting an extensive campaign the past 2 years.

The Bowdoin structure is one of the largest in the country, being 66 miles long and 62 miles wide. It has an indicated closure of 700 ft. with 1,100 sq. miles within the 250-ft. contour. Up to the end of 1939, 30 wells had been drilled. In 1940 the Montana-Dakota company completed 15 wells with an aggregate initial production of 11,226,000 cu. ft., and in 1941 to date it has completed 25 wells with an initial of 13,496,000 cu. ft. These wells were scattered over a large area, the extremes being around 18 miles apart.

The gas is found in the Bowdoin sand at around 700 ft. in the Colorado formation, and in the Phillips sand 160 ft. below the first named. The company follows the practice of spudding the wells through the gravel to around 100 ft., setting the 8-in. and then drilling with small rotary. Only one deep test has been drilled in the field, 2 Bowdoin, in 33-32n-32e, which went to 3,180 ft. in 1933, encountering water at that depth. It probably stopped within a few feet of the Madison lime.

Rumors have been current that a deep test to the Devonian is to be drilled in the field and some color was given to this report when the Department of the Interior advertised a sale of leases on December 17 on 11 parcels embracing several thousand acres. One of the provisions of the sale was that bids could be submitted for two or more parcels, provided the aggregate acreage and all other holdings of the bidder did not exceed 2,560 acres. This sale was indefinitely postponed the past week and no explanation has been forthcoming. It is believed that on account of the size of the field an effort is being made to get the Department of the Interior to increase the acreage which can be individually acquired.

### WYOMING COMPLETION

Frannie field, Park County: Continental Oil 2 Northern Pacific-2, NW SW NE 23-58n-98w, T.D. 3,447 ft., top Embar 3,345 ft., 7-in. 3,382 ft., top Tensleep 3,345 ft., 323 bbl., first 24 hr. on pump.

### MONTANA COMPLETIONS

Bowdoin field, Phillips County: Montana-Dakota Utilities 634 Kippen, C SW SW 20-32n-34e, T.D. 870 ft., in Colorado shale, 5½-in. 747 ft., 139 ft. perf. 4½-in. liner on bottom, 439,000 cu. ft., 224 lb. rock pressure.

Montana-Dakota Utilities 649 Kippen, C NW NE 25-32n-33e, T.D. 1,028 ft., 5½-in. 749 ft., 4½-in. liner on bottom, 296,000 cu. ft.

Montana-Dakota Utilities 650 Sudderock, C SW SE 24-32n-33e, T.D. 1,008 ft., 5½-in. 741 ft., 370 ft. ft. 4½-in liner on bottom, 606,000 cu. ft.

Montana-Dakota Utilities 651 Shaw, C SW SW 31-32n-34e, T.D. 795 ft., 5½-in. 660 ft., 295,000 cu. ft., 210 lb. pressure.

Montana-Dakota Utilities 655 Sudbrack, C NE SE 28-32n-34e, T.D. 870 ft., 5½-in. 746 ft., 481,000 cu. ft.

Montana-Dakota Utilities 666 Reilly, C NW NE 29-32n-34e, T.D. 1,010 ft., 5½-in. 768 ft., 439,000 cu. ft.

Bowes field, Blaine County: Independent Natural Gas 1011 Miller, SE SE SE 8-31n-19e, Eagle sand 1,097-1,147 ft., 5½-in. 1,078 ft., perf. 4½-in. liner on bottom, 4,030,000 cu. ft., 190 lb. pressure.

Box Elder field, Hill County: Montana Gas Corp. 2 fee, NE NE NW 24-32n-17e, Eagle sand 1,301-05 ft., water with trace of gas, plugged and abandoned.

Cedar Creek field, Fallon County: H. W. McDonald No. 2, C SW NW 5-5n-60e, abandoned at 2,000 ft.

Cut Bank field, Glacier County: R. C. Jeffries 2 Tribal-197, SW SW NW 30-32n-5w, T.D. 2,985 ft., 6¼-in. 2,948 ft., show oil in Sunburst 2,895-2,905 ft., Cut Bank 2,938-70 ft., main pay 2,955-70 ft., 2,600 ft. oil in hole, swabbed 350 bbl. first 24 hr.

Consolidated Gas 3 Frary-Tribal-172, SW NW NW 18-32n-5w, T.D. 2,850 ft., 7-in. 2,810 ft., Sunburst sand 2,765-90 ft., show oil 2,781-90 ft., Cut Bank 2,810-42 ft., main pay 2,832-42 ft., swabbed 225 bbl. first 24 hr.

A. B. Cobb 2 Tribal-206, SW NW SW 19-32n-5w, T.D. 3,012 ft., 7-in. 2,960 ft., show oil in Sunburst 2,935-42 ft., Cut Bank 2,955-3,005 ft., main pay 2,995-3,005 ft., swabbed 345 bbl. first 24 hr.

Kevin-Sunburst field, Toole County: Big West Oil 1 Dahlquist, C NW 6-34n-4w, T.D. 2,256 ft., 7-in. 2,207 ft., Sunburst dry at 2,166-75 ft., Cut Bank sand 2,708-55 ft., first show gas 2,208 ft., increased 2,225-55 ft., top Ellis 2,255 ft., elev. 3,460 ft., 6,600,000 cu. ft., 750 lb. rock pressure (see lead).

Superior Petroleum 4-A Government, C SE NW 24-35n-3w, T.D. 1,672 ft., contact 1,610 ft., plugged and abandoned.

Henry Vanderpas 5 Ward, CWL NW NE 29-35n-3w, T.D. 1,748 ft., in contact, acidized 500 gal., averaged 25 bbl. daily on 10-day test.

Gordon Plotke 4 Ward, SE SW SW 28-35n-3w, T.D. 1,719 ft., 10 bbl. daily on 10-day test.

Kalispel-Kevin Co. 4 State, C SE SW 16-34n-1w, T.D. 1,228 ft., 395,000 cu. ft., 75 lb. pressure, from Sunburst.

Coolidge & Coolidge 3 Jones, CSL SE SW 28-34n-1w, T.D. 1,325 ft., 250,000 cu. ft. from Sunburst.

●

## Two Indiana Pool Openers Are Officially Completed

By STAFF CORRESPONDENT

EVANSVILLE, Ind., Dec. 22.—A. B. Settle 1 Bert Edmonds, SE SW NW 16-7s-11w, pool-opening well in Vanderburg County, 5 miles southwest of Evansville, has been completed with an initial production of about 30 bbl. daily. It is producing from Waltersburg sand at 1,645-57 ft. No other immediate tests in the area are planned.

Meanwhile, Dawson & Steed 1 John Patberg, SW NW NE 16-3s-7w, near Stendal in Pike County, has been completed as a pool opener in the Cypress sand. It is yielding about 68 bbl. a day from saturation at 1,143-51 ft. Leases on more than 500 acres of land near the discovery were recorded in the county ofrice within a few hours after pay was drilled.

### OHIO

ZANESVILLE, Ohio, Dec. 22.—Operations in the Ohio fields during the past week were subnormal. Coshocton County yields the best oil well making 82 bbl. after shot from the Clinton. The Brush Creek pool in Muskingum and Morgan counties was the most active, topped by a 1,300,000-cu. ft. gasser in Muskingum County. Two tests are nearing completion in Morgan County.

### OHIO COMPLETIONS

Ashland County, Lake Township: Roy Stewart 1 Luther Long, Sec. 2, dry, Clinton, T.D. 3,071 ft.

Mohican Township: Hoag et al 1 David Aber, Sec. 26, dry, Berea, T.D. 704 ft.

Wanda Keiffer 1 Ellen Scott, Sec. 4, show gas, Berea, T.D. 661 ft.

Athens County, Bern Township: Bern O. & G. 3 Myron Kenney, Sec. 2, dry, Maxon (water), T.D. 1,143 ft.

Coshocton County, Perry Township: Preston Oil 7 F. H. Donaker, Sec. 16, 82 bbl., 55,000 cu. ft. gas, shot, Clinton 3,072-3,124 ft., T.D. 3,130 ft.

Knox County, Union Township: Bud Fisher 1 Goldie Harmer, Sec. 130,000 cu. ft. gas, Clinton 2,754-2,802 ft., T.D. 2,812 ft.

Licking County, Mary Ann Township: Pat Oil & Gas Co. 4 Harriett Newlon et al, Sec. 6, 8 bbl., Berea, T.D. 747 ft.

Ridgeway et al 6 Charles Richards, fourth quarter, 5 bbl., Berea, T.D. 831 ft.

Lorain County, Ridgeville Township: Edson & Son 1 J. Szabo, Lot 40, dry, Clinton 2,452 ft.

Lucas County, Waterville Township: J. S. Brailey 1 Tom Jeffers, Sec. 24, dry, top of Trenton 1,630 ft., T.D. 1,819 ft.

Medina County, Hinckley Township: William Dempsey 2 Francis Wallace, Lot 90, 240,000 cu. ft. gas, Clinton, T.D. 3,583 ft.

Meigs County, Orange Township: H. B. Walker Co. 1 E. A. Person, Sec. 36, 100,000 cu. ft. gas, Berea, T.D. 1,659 ft.

Olive Township: Ray Proffitt et al 1 Major Powell, Sec. 29, dry, T.D. 900 ft.

Morgan County, Homer Township: D. T. Orndoff 4 J. L. Glass, Sec. 8, show gas, shot, no increase, plugged, second Berea, T.D. 1,280 ft.

Marion Township: Williams Bros. 1 N. M. Wood, Sec. 33, 70,000 cu. ft. gas, shot, second Berea, T.D. 1,451 ft.

Williams Bros. 2 Ida Greathouse, Sec. 2, dry, Maxon (water), T.D. 950 ft.

York Township: Swingle et al 2 Charles Bush, Sec. 25, 180,000 cu. ft. gas, shot, Berea, T.D. 1,116 ft.

Muskingum County, Harrison Township: Pure Oil Co. 1 S. J. Moore, Sec. 31, 1,300,000 cu. ft. gas, Clinton 4,170-4,220 ft., T.D. 4,221 ft.

Ohio Fuel 2 Harvey Floyd, Sec. 14, 75,000 cu. ft. gas, shot, Clinton 3,980-4,006 ft., T.D. 4,031 ft.

Noble County, Enoch Township: E. H. Crock Oil Co. 1 Mary Crum, N½ Sec. 27, 5 bbl., Macksburg, T.D. 568 ft.

Perry County, Thorn Township: Palm Oil Corp., Inc. et al 1 H. L. Yaney, SE Sec. 14, 1,250,000 cu. ft. gas and 25 bbl. oil, Clinton sand, T.D. 2,806 ft.

Clayton Township: Pure 2 B. J. Williams, SE Sec. 7, 90 bbl., Clinton, T.D. 3,288 ft.

Stark County, Osnaburg Township: Stark Brick Co. 1 fee, Sec. 18, show gas in Shell 4,791-4,825 ft., shot, did not increase, Clinton 4,856-4,913 ft., dry, T.D. 4,999 ft.

Washington County, Liberty Township: Fifteen O. & G. Co. 8 John Schenkel, Sec. 4, 150,000 cu. ft. gas, 2 bbl., shot, lime, T.D. 1,476 ft.

Homer Burkhart et al 2 John Schenkel, SW¼ Sec. 4, 2 bbl., lime, T.D. 1,500 ft.


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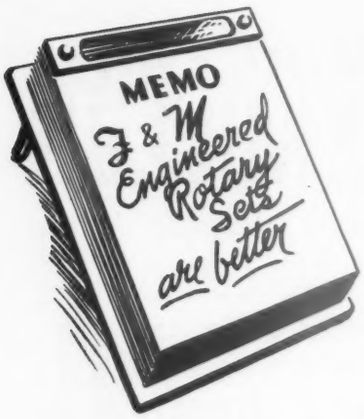


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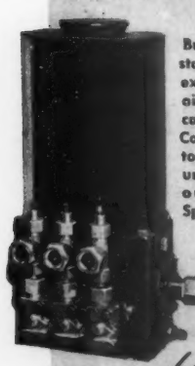

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# Among the Drilling

## Turnkey Contracts Excluded From Expense Item in Tax Regulation

CLARIFICATION came this week in the Internal Revenue Bureau's policy on the deduction of drilling expenses from the income of oil companies and independent operators.

Operators may charge to expense, for income-tax purposes, intangible drilling and development costs incurred through payments to contractors for drilling done on a footage basis.

Turnkey contracts, requiring the driller to furnish all labor and materials needed for the completion of the well, must be treated as capital expenditures for income-tax purposes, the bureau ruled.

Most of the contracts now common in the oil industry between drilling firms and operating companies are based on footage payments.

Consequently, the new ruling which displaces an earlier move to force capitalization of all drilling expenses incurred through contract work, leaves the relationship between contracting and operating firms substantially unchanged.

In last week's report on decision of the Internal Revenue Bureau to continue previous interpretation on deductability of drilling expenses there was no differentiation made between the policies regarding "footage" and "turnkey" contracts.

NELSON Drilling Co., Hutchinson, Kans., has assigned tools to a wildcat location in Dickinson County, Kansas, 7 miles northeast of the Lost Springs pool. The firm's 1 Will is to be drilled in SE SE NE 8-16-4e.

DUNCAN Drilling Co., Oklahoma City, Okla., has been awarded contract for Texas Pacific Coal & Oil Co. 1 Miller-Looney, 14 miles southwest of Gail in southwestern Borden County, West Texas. The operator recently purchased the wildcat from C. E. Hyde and Dean Brothers, Fort Worth, Tex., and a half interest in the 5,000-acre drilling block. The 1 Miller-Looney is in 10-33-4n, T.&P. Survey. The test is now drilling below 1,185 ft. with cable tools.

A. E. BRACE, California contractor, has agreed to drill a group of shallow wells in the Kern River field for the S. & W. Oil Co. of Glendale.

BELL & LOFFLAND, Los Angeles, Calif., has obtained contract to drill Western Gulf Oil Co. 1 Jack in the Rio Bravo field. The well, to be started immediately, will be bottomed at approximately 11,500 ft.

GEORGE LIVERMORE, contractor and operator of Midland, Tex., is to drill the 6,000-ft. wildcat recently staked by Henry Roach and L. B. Benton, of Fort Worth, Tex., in the southwest corner of Lubbock County, West Texas. Contract calls for a test of the Slaughter field pay. The wildcat is the 1 Stanolind-Texas Land & Mortgage Co., in SW SW Section 64, Block 20, H.E.&W.T. Survey. The contractor also recently completed a wildcat for Broderick & Calvert et al in north central Bailey County, West Texas. The test was 1 G. H. Hayward, dry at 5,601 ft.

OSAGE Drilling Co., Oklahoma City, Okla., contractor for the Likins & Hall 1 E. H. Jones, at the latter part of the week was drilling below 6,400 ft. at their 7,200-ft. wildcat in Gaines County, northern West Texas. The test is several miles southwest of the Gaines County portion of the Wasson field. It is expected that the deep Wasson pay may be picked up around 6,500-6,600 ft.

CHRISTIAN Drilling Co., Bakersfield, Calif., has had to discontinue operations temporarily on Eyer Oil Co. 2 in the Mount Poso, California, field because of impassable roads. The test is nearing completion.

RICHMOND Drilling Co., Odessa, Tex., has been awarded contract for a wildcat 1 mile south of the West Andrews pool in Andrews County, West Texas. The test will be Fuhrman Petroleum Co. 1 Thornberry. Contractor is preparing to spud.

DELTA Drilling Co., Dallas, Tex., is moving one of its rotary rigs to the James Walton lease on the north flank of the Chapel Hill field, Smith County, Texas, where a well is to be drilled on a farmout arrangement with Humble Oil & Refining Co.

NOBLE Drilling Co., Tulsa, at the latter part of the week was drilling below 4,742 ft. at the Stanolind Oil & Gas Co. 1 Williams in northwest Hockley County, northern West Texas. The wildcat cored from 4,724 to 4,742 ft., the core showing some porosity and light oil stains, but a 55-minute drill-stem test recovered only mud. The wildcat is in Labor 21, League 717, Capitol Survey, 8 miles north of Levelland and 20 miles north of the large Slaughter field.

H. J. DeARMAN, Houston, Tex., has started another operation on the

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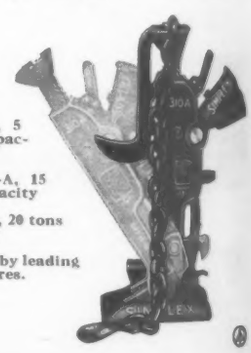

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# Contractors

Bayou Blue dome, Iberville Parish, Louisiana, for Union Sulphur Co.

DRILLING equipment and territory served by Twin Drilling Co. has been divided between J. E. (Jonnie) Holm and C. M. Ashby, former vice president and president, respectively, of the latter firm and two corporations have been established to replace the dissolved firm, Holm Drilling Co., headed by Mr. Holm, will operate exclusively in the Mid-Continent area. The Ashby Drilling Co., headed by Mr. Ashby, will confine its operations to the Michigan and northern areas. F. M. Rush and J. C. Hatfield have become vice president and secretary-treasurer, respectively, of the Holm Drilling Co., which will headquarter in Tulsa.

HOUSTON Drilling Co., Houston, Tex., has apparently opened a new field or an important extension to the Mauritz field, Jackson County, Texas, with the recovery of pipe-line oil on a drill-stem test in Stewart Boyle et al 1 Rodesney. The well is located about 22 miles east of the Ganado field, and about the same distance northeast of the Mauritz field. The drill-stem test was made at 5,090 ft., and the well is drilling ahead in shale below 6,200 ft. Contract depth is 7,500 ft. In the Bammell field, Harris County, Texas, one rotary is running for Frank Corzelius.

JORDAN Drilling Co., Houston, Tex., is preparing to run casing in the company's 1 Rodak, located on the north side of the Livingston field, Polk County, Texas. Sand showing oil and gas was cored at intervals in the regular field pay from 4,169-79 ft. Total depth is 4,270 ft. This is the first well to be drilled in the field in several months, and additional wells are to be drilled.

ROWAN Drilling Co., Houston, Tex., is drilling below 8,700 ft. in W. H. Land, a wildcat located in Chambers County, Texas, which is being drilled jointly with the Nichols Oil Co. The well is credited with having logged showings of gas below 8,200 ft. On the Danbury dome, Brazoria County, Texas, another producer was being completed on the Jamison lease.

E. J. GRACEY, Houston, Tex., has one rotary running in the active North La Ward field, Jackson County, Texas, for Moore & Ahern, while in the Lovells Lake field, Jefferson County, Texas, another operation was recently started for Shell Oil Co., Inc.

CRON & GRACEY Drilling Corp., Houston, Tex., has started a new operation in the Lake Long field, La Fourche Parish, Louisiana, for Fohs Oil Co. In the meantime two other rigs are running at the Iowa and West Lake Verret fields for Shell Oil Co., Inc., while in the East White Lake field, Vermilion Parish, drilling continues with one rig for the Union Oil Co. of California.

## Engineering Background Fits Son To Continue Brock Drilling Co.

Practical experience as a petroleum engineer for two companies following graduation from the University of Oklahoma with a degree in that profession fitted Lawrence E. Brock to take over direction of Brock Drilling Co., Abilene, Tex., when his father, Lawrence E. Brock, Sr., died recently.

Mr. Brock was formerly petroleum engineer in the Stanolind Oil and Gas Co. general offices, Tulsa, and before that was associated with Gulf Oil Corp. He was graduated with a degree in petroleum engineering and geology in 1936. While in school, he was president of the University of Oklahoma chapter of the A.I.M.E., president of Sigma Gamma Epsilon, honorary geological fraternity, president of the Petroleum Engineer's Club, St. Pat's Council and L.K.O.T. After graduation, Mr. Brock worked in Colorado, New Mexico, Kansas and Texas.

The Brock Drilling Co. has been operating in West Texas for 20 years. The firm is operating tools in the Sundown area, Hockley County, and in Scurry and Mitchell counties, West Texas. Headquarters are maintained at Abilene, Tex., where Mr. Brock is associated with an uncle, J. H. Brock.

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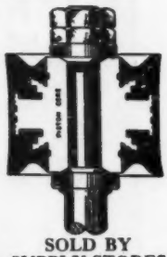

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## Two Producing Areas Opened By North Texas Wildcatters

By D. H. STORMONT

WICHITA FALLS, Tex., Dec. 22.—The active wildcatting campaign in North Texas the past month paid off again last week with the definite assurance of two new oil-producing areas for the district. One of the new pools was opened in the northeastern part of Young County and the other in Clay County. Both found production in the Caddo lime

The Young County pool was assured by Kerlyn Oil Co. and Phillips 1 McClure, Block 1952, T.E.&L. Survey, which found Caddo pay at 4,045-70 ft. Operator treated the test with 4,000 gal. of acid, after which it flowed 103 bbl. of oil in 4 hours through ½-in. choke on tubing. Shut-in casing pressure was 750 lb. with 350 lb. flowing pressure on the tubing. Previously, operator had set 7-in. casing at 4,045 ft.

In Clay County, with 7-in. casing set at 5,584 ft., Continental 1 Earl Spring flowed 102 bbl. of fluid, 80 per cent wash water, in 6 hours from a section of the Caddo lime at 5,594-5,630 ft. Production was natural. Official gage credited the well with flowing 70 bbl. of 48-gravity oil the first 4 hours of an 8-hour test and 71.7 bbl. the last 4 hours.

#### Three Wildcats Testing

H. L. Hunt 1 T. R. Jones, a wildcat in the J. Thomas Survey, Denton County, set 5½-in. casing in the conglomerate at 5,520 ft. and will test intermittent oil shows. . . . Hanlon-Buchanan, Inc., 1-B Hoefle, south offset to the discovery well in the Hoefle pool opened by Taubert & McKee in the A. James Survey, Jack County, set 5½-in. casing at 4,869 ft. to test the Caddo lime. . . . In Archer County, Golding & Cochran 1 Krunkel, B.B.B.&C. Survey, was bailing down preparatory to perforating 7-in. casing set at 4,960 ft. for a production test.

### NORTH TEXAS COMPLETIONS

#### Wildcats

Archer County: Dr. K. Van Allen 1 E. C. Kelley, 330 ft. from N and E lines Sec. 68, Harris subdiv. of Club ranch, dry at 5,637 ft., Ellenburger 5,526 ft.

Jack County: Parker & Farris 1 Lewis, 467 ft. from S and W lines of E 80-ac. tract, Blk. 2, Navarro C.S.L. Sur. A-443, dry at 3,404 ft., Palo Pinto 1,165 ft.

Magnolia 1 Borden, 1,000 ft. from N and 500 ft. from W lines W. R. Smith Sur. A-547, dry at 7,048 ft.

Montague County: Bruce Sullivan 1 E. E. Johnson, Sec. 5, E.T. Sur. A-230, dry at 6,532 ft., top Caddo 6,366 ft., old well drilled deeper.

#### Fields

Griffin, Archer County: K. & G. Production Co. 2-G E. P. Griffin, Sec. 12, Palo Pinto C.S.L. Sur., 85 bbl. in 24 hr., pumping, pay 4,444-46 ft.

K.M.A., Wichita County: Hanlon-Buchanan 15-E Fassett & Tuttle, Sec. 4, S.A.&M.G. Sur. A-582, 65 bbl. in 24 hr., pumping, K.M.A. 3,861 ft., T.D. 4,033 ft.

Hanlon-Buchanan 28-E Fassett & Tuttle, S.A.&M.G. Sur. A-582, est. 190 bbl., shot 3,966-4,012 ft., K.M.A. 3,837 ft.

Hanlon-Buchanan 34-G Fassett & Tuttle, S.A.&M.G. Sur. A-572, est. 225 bbl., K.M.A. 3,884 ft., shot 4,048-80 ft.

Hammon, Hanlon-Buchanan 49-D Fassett & Tuttle, Sec. 1, E.T. Sur. A-76, dry at 650 ft.

Coppock & Coleman 21 W. L. Warren, Sec. 32, H.W. V.F. Sur., 53 bbl. in 24 hr., pumping, pay 1,758-66 ft.

Perry Browning 1-B C. J. Simpson, Sec. 33, K.W.V.F. Sur., 64 bbl. in 24 hr., pumping, pay 1,512-42 ft., T.D. 1,796 ft.

Fain-McGaha 8-C E. P. Griffin, Sec. 6, W. H. Spillers Sur. A-257, est. 290 bbl., K.M.A. 3,688 ft., shot 3,765-3,808 ft., T.D. 3,830 ft.

Murchinson & Wynne 1 Big Wichita River, Wichita River Bed Sur., est. 750 bbl., Ellenburger 4,190 ft., acid 4,211-60 ft.

Tide Water and Perkins-Cullum 10 W. P. Ferguson, Sec. 1, W. H. Spillers Sur. A-257, est. 390 bbl., Ellenburger 4,294 ft.

K.M.A., Wilbarger County: Consolidated Oil Co. 2-C G. B. Ancell, Sec. 2, Blk. 7, H.&T.C. Sur., est. 390 bbl., Ellenburger 4,260 ft., acid 4,289-91 ft., old well drilled deeper.

Nocona, Montague County: Jack Story, Jr., 4 M. H. Salmon, Samuel Little Sur. A-417, dry at 944 ft.

Throckmorton, Throckmorton County: R. F. Gillman 1 O. L. Kunkel, Sec. 1, S.P. Sur. A-252, dry at 675 ft.

Wilbarger, Wilbarger County: Phillips 6 Waggoner II, Sec. 55, Blk. 4, H.&T.C. Sur., est. 325 bbl., pay 3,013-18 ft., T.D. 3,107 ft.

## West Central Texas Work Declines

FORT WORTH, Tex., Dec. 22.—Activity in the West Central Texas district showed a marked decline last week. Four wildcat tests were staked to bring to a total of 29 the number now actually drilling in the district. New locations were: J. C. Hunter 1 Anderson estate, a scheduled 3,350-ft. Palo Pinto lime wildcat, in Taylor County, near five small shallow producers, in the SE SW Section 8, L.A.L. Survey; Homer Beasley 1 P. G. Hatchett, 330 ft. from the west and 990 ft. from the north lines of Section 22, D.&D.A. Survey, 5 miles southeast of Baird in Callahan County; B. A. Duffy 1 Robert Wilson, Section 76, Block 8, H.&T.C. Survey, 10 miles southwest of Eden, in Concho County; and Aztec Oil Co. 1 C. B. Reese, 440 ft. from the northeast and 905 ft. from the northwest lines of a 185-acre lease in the W. R. Prewitt Survey, 3½ miles northwest of Granbury, in Hood County.

### WEST CENTRAL TEXAS COMPLETIONS

#### Wildcats

Brown County: R. H. Brock 1 B. J. Adams, 900 ft. from S and 600 ft. from W lines Lot 17, Charles Messer Sur. 127, dry at 1,078 ft.

Semiwildcat: G. A. White 1 Moore, John M. Ross Sur. 610, dry at 688 ft.

Callahan County: C. B. Holmes 1 T. W. Gray, 150 ft. from N and 600 ft. from E lines of W½ of Sec. 40, D.D.&A. Sur., dry at 469 ft.

Eastland County: Miles & Francisco 1 J. P. Mitcham, Sec. 3175, T.E.&L. Sur., dry at 644 ft.

Jones County: Semiwildcat, M. L. Delaney 2 O. D. Swanson, Sec. 195, B.B.B.&C. Sur., dry at 3,300 ft.

W. L. Snoddy 1 L. L. Huddleston, Sec. 41, T.&P. Sur., Blk. 18, dry at 3,080 ft.

Palo Pinto County: E. Lloyd 1 G. A. Dalton, W. Lewis Sur. 83, dry at 1,474 ft.

Shackelford County: Dickey Bros. 2 W. F. Tucker, 450 ft. from SW and 1,520 ft. from SE lines Sec. 553, T.E.&L. Sur., dry at 501 ft.

Stephens County: T. G. Shaw 1 E. Whalen, Sec. 1089, T.E.&L. Sur., 10,450,000 cu. ft. gas, top Caddo 3,342 ft., top Marble Falls 3,875 ft., pay 4,077-85 ft., T.D. 4,707 ft.

#### Fields

Akard, Jones County: J. L. McMahon 3 Dorthy Akard, Gaudalupe Martinez Sur. 137, 25 bbl. oil and 20 bbl. water, pumping, shot 2,141-48 ft.

Amity, Comanche County: L. H. Coate 5 T. A. Smith, Lot 3, Lampasas CSL Sur. 34, A-608, 31 bbl., pumping, shot 600-38 ft.

Brownwood Gas pool, Brown County: Hightower Oil & Refg. Co. 1 Whidden, William Iron Sur., 320,000 cu. ft. gas, pay 1,472-83 ft., T.D. 1,584 ft.

Nail, Shackelford County: Hickok & Reynolds 16-A J. H. Nail, Sec. 133, E.T. Sur., dry at 1,698 ft.

Shackelford, Shackelford County: Grace T. Knight 3-B G. R. Davis, Sec. 219, E.T. Sur., 116 bbl., pumping, shot 1,580-93 ft.

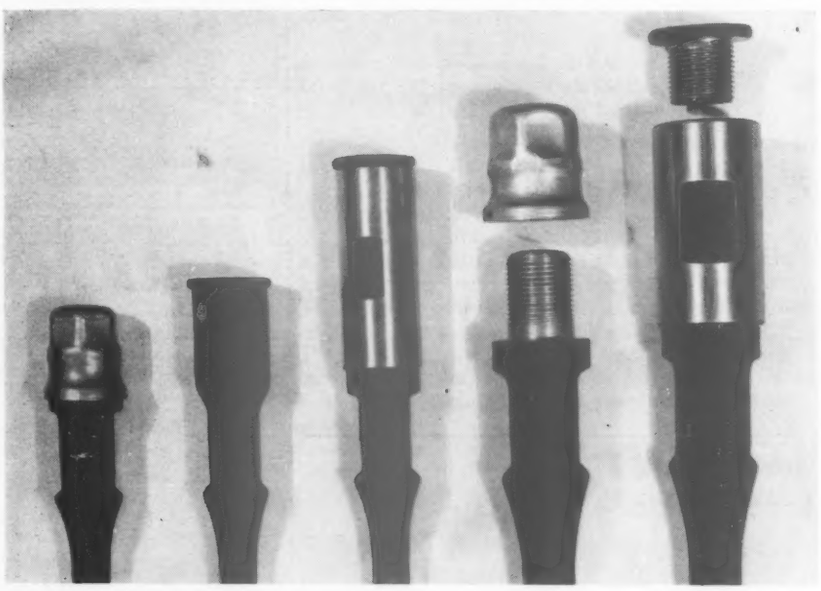
Stephens, Stephens County: Shertzer Bros. 27 Stuart, Sec. 70, T.&P. Sur., Blk. 4, 2 bbl., pumping, shot 1,788-95 ft.

Triplett, Jones County: T. D. Humphrey 5-A M. V. Triplett, J. J. Hughs Sur. 256, dry at 2,561 ft.

Wimberly, Jones County: Merry Bros. & Perini 2 A. M. Wimberly, Lot 106, Godwin subdiv. of De Witt C.S.L. Sur. 126, est. 325 bbl., pay 2,219-31 ft.


# Hundreds of Thousands of Feet In South American Service WITHOUT ONE COMPLAINT

## CENTENARES DE MILLARES DE PIES EN SERVICIO EN LA AMERICA DEL SUR SIN LA MENOR QUEJA



*Jones Sucker Rods: Pin Ends, Box Ends and Couplings With Thread Protectors Showing Superior Quality of Workmanship and Forgings.*

*Las varillas de bomba, extremos de vástago, extremos de caja y acoplamientos con protectores de rosca, de marca Jones, se caracterizan por superior calidad en fabricación y projecto.*

This year The S. M. Jones Company celebrated its 50th anniversary of service to the oil industry. Since 1891 Jones Sucker Rods have been the favorite wherever severe pumping conditions demand better sucker rods. With scientific design, laboratory testing and field experience, this pioneer company has supplied sucker rods to South American and other major fields that have pumped millions of barrels of oil without one failure.

Este año, la S. M. Jones Company celebra su 50 aniversario de servicio a la industria del petróleo. Desde 1891, las varillas de bomba Jones han sido las favoritas en todo lugar donde las severas condiciones de extracción por bomba exigen mejores varillas. Gracias a estudios científicos, ensayos de laboratorio y experiencia práctica, esta compañía, una de las primeras en el ramo, ha suministrado varillas de bomba a los campos petrolíferos de la América del Sur y de otras partes del mundo, que han manejado millones de barriles de petróleo sin el menor inconveniente o falla.

# The S. M. JONES Co.

## JoneSuckeRods

General Office and Factory, Toledo, Ohio

Sales Office, McBirney Bldg., Tulsa, Okla. Export Office, 19 Rector Street, N. Y. City

## Alberta Shallow Field Is Extended Further

By VICTOR LAURISTON

CHATHAM, Ont., Dec. 22.—In the Vermilion shallow field, East Central Alberta, Princeville 2, LSD 1, 31-50-5w4, developed a small flow at 1,792 ft. It was deepened to 1,797 ft., to secure a steady flow of 35 bbl. daily. The completion marks a further extension of the field. Vermilion Consolidated 12, LSD 3, 23-49-6w4, and Western Battleview 3 have finished around 1,800 ft. and are awaiting test.

Northwest Co., a subsidiary of Imperial Oil, is carrying on a survey and drilling some structure tests on holdings northwest of Vermilion. In the proven section of the field, Flobell 1 will be drilled by New York interests on acreage of Vermilion Consolidated Oils. In the Lloydminster section, Dina-Omega 2 has location in LSD 12, 9-45-1w4. It is expected that the new processing plant at Borrodaile, designed to treat Vermilion heavy crude for the production of fuel oil, will be in operation by January 1.

### Test for Aldersyde Structure

A new test of the Aldersyde structure, east of Turner Valley, will be drilled by New Ranchmen's Gas & Oil Co., which is being incorporated with Alberta charter by Maynard J. Davies, B. O. Jones and associates. The new company will control 22,000 acres in Townships 19 and 20, Ranges 28 and 29w4, including holdings of Ranchmen's Gas & Oil Co., whose No. 1 test, LSD 16, 30-20-29w4, has been standing unfinished at 7,240 ft. Ranchmen's 1 entered the Dalhousie sand at 7,220 ft. after encountering numerous shows of gas and light crude. In addition to a new well, which is now being located, the New Ranchmen's company is planning to complete the original test, which should reach the limestone in a couple of hundred feet. Rotary tools will be used.

### Saskatchewan Operations

In southeastern Saskatchewan, Bobjo Mines, headed by Robert Jowsey, has secured a reservation on more than 5,000 sq. miles extending 100 miles west from the Manitoba boundary and 50 miles north from the international line. The area centers in the Arcola and Carlyle districts, and runs west to near Estevan and the northern portion includes Indian lands and the Moose Mountain Park. Prof. F. H. Edmunds, of the University of Saskatchewan, is consulting geologist for the company, which is carrying on extensive geological work, including the drilling of a series of structure tests. Actual development will probably be undertaken early in 1942.

### Alberta Production

Crude and natural-gasoline production from all Alberta fields for the week ending December 8 averaged 28,189 bbl. daily, compared with 28,411 bbl. daily for the previous week and 22,720 bbl. daily for the corresponding week last year.

### Turner Valley Lime Tests

North Turner Valley: Home Oil 9, LSD 9, 15-20-3w5, T.D. 8,478 ft., Madison at 7,974 ft., completing tests with fair producer indicated.

Royalite Oil 60, LSD 5, 14-20-3w5, finished at 8,216 ft., Madison lime at 7,703 ft., acidizing and testing.

Foothills Oil & Gas 10, LSD 2, 4-21-3w5, deepening in Madison limestone from 6,731 ft.

West-Central Section: Royalite Oil 61, LSD 5, 19-19-2w5, drilling in Madison limestone from 7,167 ft.

United-British American 1, LSD 16, 12-19-3w5, T.D. 8,418 ft., Madison at 7,945 ft., acidizing and testing.

Southwest Petroleum 6, LSD 5, 8-19-2w5, finished at 7,000 ft., Madison at 6,562 ft., acidizing and testing.

Drillers & Producers 1, LSD 13, 7-19-2w5, T.D. 8,042 ft., Madison at 7,599 ft., initial production 241 bbl. daily.

### New Tests Starting

North Turner Valley: Adanac 1, LSD 10, 19-21-3w5, location.

Northend Petroleums 2, LSD 13, 9-21-3w5, spudded.

West Central Section: Southwest Petroleum 7, LSD 13, 8-19-2w5, spudding.

Royalite Oil 63, LSD 8-9, Section 7-19-2w5, spudding.

### Outside Fields

Grease Creek: Grease Creek-Northwest 2, LSD 7, 13-29-7w5, below 3,796 ft.

Clearwater: Ram River Oils 2, 1-37-11w5, below 3,310 ft.

●

## Selected Crude Prices

Representative selected crude prices from all sections of the country appear below:

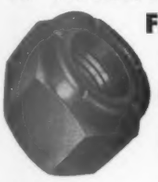
| | |
|---|---|
| East Texas | $1.25 |
| Conroe | 1.43 |
| Tepetate, Louisiana | 1.18 |
| Smackover, Arkansas, heavy | .83 |
| Illinois basin | 1.37 |
| Pecos County, Texas | .95 |
| Lance Creek, Wyoming | 1.12 |
| Bradford, Pennsylvania | 2.75 |

### Gravity Schedules

Top prices include all gravities above grades designated, and low prices include all gravities below grades designated:

| Gravity | Signal Hill Calif. | Oklahoma, Kansas | Gulf Coast, Texas | West Texas, Lea County, N.M. |
|---|---|---|---|---|
| 18-18.9 | $0.80 | ... | ... | ... |
| 19-19.9 | .84 | ... | $1.06 | $0.70 |
| 20-20.9 | .88 | $0.85 | 1.08 | .72 |
| 21-21.9 | .92 | .87 | 1.10 | .74 |
| 22-22.9 | .96 | .89 | 1.12 | .76 |
| 23-23.9 | 1.00 | .91 | 1.14 | .78 |
| 24-24.9 | 1.03 | .93 | 1.16 | .80 |
| 25-25.9 | 1.07 | .95 | 1.18 | .82 |
| 26-26.9 | 1.11 | .97 | 1.20 | .84 |
| 27-27.9 | 1.15 | .99 | 1.22 | .86 |
| 28-28.9 | 1.18 | 1.01 | 1.24 | .88 |
| 29-29.9 | 1.20 | 1.03 | 1.26 | .90 |
| 30-30.9 | 1.23 | 1.05 | 1.28 | .92 |
| 31-31.9 | ... | 1.07 | 1.30 | .94 |
| 32-32.9 | ... | 1.09 | 1.32 | .96 |
| 33-33.9 | ... | 1.11 | 1.34 | .98 |
| 34-34.9 | ... | 1.13 | 1.36 | 1.00 |
| 35-35.9 | ... | 1.15 | 1.38 | 1.02 |
| 36-36.9 | ... | 1.17 | 1.40 | 1.04 |
| 37-37.9 | ... | 1.19 | 1.42 | 1.06 |
| 38-38.9 | ... | 1.21 | 1.44 | 1.08 |
| 39-39.9 | ... | 1.23 | 1.46 | 1.10 |
| 40 and above | ... | 1.25 | 1.48 | 1.12 |


For VIBRATION-PROOF FASTENINGS ON OIL FIELD EQUIPMENT



Elastic Stop Self-locking Nuts put an end to maintenance troubles resulting from loose fastenings. They can not be loosened by vibration, shock loads, or exposure to weather. Available in all standard sizes.

SPECIFY THEM ON NEW EQUIPMENT AND USE THEM FOR REPLACEMENT

Sold by leading supply houses.

Factory stocks in Houston and Los Angeles.

CATALOG contains a graphic explanation of the Elastic Stop principle, presents test and application data, and lists the complete line of nuts. ● Write for a copy.

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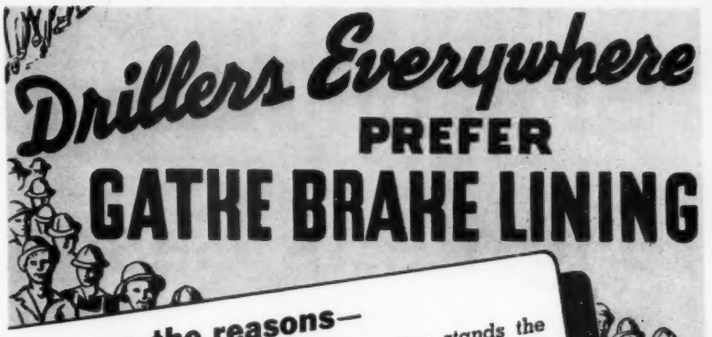
ELASTIC STOP NUT CORPORATION
2362 VAUXHALL ROAD ● UNION, NEW JERSEY

Elastic Stop SELF-LOCKING NUTS



Drillers Everywhere PREFER GATKE BRAKE LINING



Here are the reasons—

- GATKE Deep-Well-Woven Brake Lining stands the heat and holds.
- Feeds off smoothly and evenly from the top of the hole all the way down.
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- Prolongs flange life.
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No wonder Manufacturers of Oil Field Equipment use GATKE Brake Lining predominantly.

Avoid substitutes. Your Rig Manufacturer has GATKE Brake Lining that is engineered for the job.

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Fabric Gears and Pinions
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GATKE CORPORATION
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### LEGAL

Department of the Interior, United States Land Office, Cheyenne Wyoming. Notice is hereby given that the oil and gas deposits in the following tracts are offered to the responsible qualified bidder of the highest bonus per acre for leasing, pursuant to the provisions of Section 17 of the act of February 25, 1920 (41 Stat. 437) as amended by the act of August 21, 1935 (49 Stat. 674) at the royalty rate scale in the lease form shown in Circular 1386, at a sale to be held in this office at 10:00 A.M., on January 22, 1942: South Oregon Basin field—Parcel No. 1, N½ N½ Sec. 5, T. 50 N., R. 100 W., 6th P.M., 161.50 acres; Parcel No. 2, W½ W½ Sec. 33, 160 acres; No. 3, NE¼ Sec. 32, 160 acres; No. 4, SE¼ Sec. 29, 160 acres; No. 5, SW¼ NE¼, S½ NW¼ Sec. 29, 120 acres; No. 6 SE¼ SW¼ Sec. 30, E½ NW¼ Sec. 31, 120 acres, all in T. 51 N., R. 100 W., 6th P.M.; North Oregon Basin Field—Parcel No. 7, SE¼ SE¼ Sec. 7, T. 51 N., R. 100 W., 6th P.M., 40 acres. The successful bidder must deposit on the date of sale with the Register, a certified check on a solvent bank, or cash, for one-fifth of the amount bid by him and file a showing of qualifications to receive a lease required by Section 7 of Circular 1386. The remaining four-fifths of the amount of the bid, together with the annual rental at the rate of $1.00 per acre must be paid, and a $5000 corporate surety bond furnished prior to the issuance of the lease. Bidders are warned against violations of the provisions of Section 59 of the United States Criminal Code, approved March 4, 1909, prohibiting unlawful combination or intimidation of bidders. The right is reserved to reject any and all bids at the discretion of the Secretary of the Interior. Register.


New MAC PLUNGER BARREL

for 2-inch tubing

*Gypsum cannot form in this barrel.*

Outlasts three ordinary barrels, as Steel Plunger works in and out of Cast Iron Barrel as much as 2 feet on the up and down stroke and more if desired, thus flushing itself free of sand or gypsum.

Reversible Valve Body and Plunger make for lowest upkeep.

Furnished with 2-Cup Standing Valve and with, or without, Garbutt Rod.

Save, with the New "MAC"! Ask for complete details and price list.

McGREGOR
WORKING BARREL COMPANY
Bradford, Pa., U.S.A.

# Shift of Tankers to West Coast Tightens Eastern Oil Market

NEW YORK, Dec. 22.—The East Coast market remains unchanged. The volume of spot-market sales has been negligible for months. A tighter situation is in prospect. The change to somewhat more seasonable weather and the indicated transfer of tankers from Gulf-Atlantic service to the Pacific has removed all evidence of weakness from the market and the establishment of virtual ceilings will serve as a barrier to higher prices. With these opposing influences governing the market, its present static condition is expected to continue.

Heating oil benefited from the colder weather and the increase in demand has removed all indication of price weakness. The cold weather that prevailed during the second week of December resulted in the most substantial draft on East Coast fuel stocks of the season, a reduction of 760,000 bbl. This was the fourth consecutive week in which stocks dropped but withdrawals in the three preceding weeks were all less than 200,000 bbl. In aggregate this is a decline of about 5 per cent from the November 15 peak but it left stocks 37 per cent greater than at the corresponding period a year ago. Inventories of heating oils are in strong hands.

Gasoline continues firm at 8.5 cents for 72-74 octane material in the New York Harbor area despite the fact that inventory accumulations for the 1942 season have started. An increasing volume of lease-lend requirements is reported being met from the East Coast as a result of the greater availability of supplies. This may account for the drop in aviation-gasoline stocks which were down to 587,000 bbl. on December 13 against a high of about 1,000,000 bbl. earlier in the fall.

While present retail prices are higher than they were last year the recent report of the American Petroleum Institute on average prices shows that even the peak reached on December 1 this year was only equivalent to the 1938 average and that the average for 1941 was lower than that of both 1933 and 1939. The increase in the 50-city average retail price from December 1, 1940, to December 1, 1941, was 1.98 cents. While this is a substantial increase actually it only returned the average price to levels that maintained before the lows that were experienced in 1939, 1940 and early 1941. The report shows the following average prices for recent years: 1941. 13.3 cents; 1940, 12.75 cents; 1939. 13.31 cents, and 1938, 14.07 cents. From this summary it is apparent that the gains of the past year merely effected a recovery for gasoline prices and do not represent increases above normal levels.

Some observers hold that the tanker transfer will be accompanied by a return of the consumption restrictions that prevailed last summer and fall. Several things act against this possibility. In the first place fewer tankers were available earlier in the fall but through resort to rail shipments and better use of available pipe lines the industry not only met all demands but succeeded in making more than normal additions to storage. Secondly there are three new pipe lines in operation which will ease the demands on tankers, the Portland-Montreal line, the Southeastern line and the Plantation line.

## Lend-Lease Purchases on Coast Total 5,200,000 Bbl.

HOUSTON, Tex., Dec. 22.—Bids were received by the U. S. Navy from Gulf Coast refiners the past week for an additional 5,200,000 bbl. of refined products for delivery during the remainder of December, January, February, and March for lend-lease account. Of this amount 750,000 bbl were gasoline with a minimum of 67 octane; 875,000 bbl. burning oil; 190,000 bbl. vaporizing oil (comparable to a tractor fuel of 50 octane); 945,000 bbl. of special straightrun gas oil; 1,700,000 bbl. of pool gas oil of 45-centane rating; 700,000 bbl. of diesel gas oil, and 40,000 bbl. of other products. Bid prices ranged from $1.67 per barrel (3.97 cents per gallon) for January delivery on diesel gas oil to $2.09 per barrel (4.97 cents per gallon) for March special gas oil.

Burning oil for January delivery was quoted at $2.57¼ per barrel (6.125 cents per gallon), while gasoline for January delivery was offered at $2.83½ per barrel (6.75 cents per gallon).

Various inquiries for kerosene and No. 2 fuel were being circulated during the week in addition to the lend-lease requests. No actual sales were reported. Kerosene continues to be quoted from 4 to 4.5 cents with material scarce. No. 2 fuel is quoted from 4 to 4.25 cents. This is one of the few products on the Gulf Coast of which there is no shortage. However, what No. 2 fuel is available is in strong hands and with the prospects for early increase in demand, prices are firm.

A cargo of Bunker C fuel oil was reported sold during the week bringing 85 cents. Other than this, sale and movement of material from the Gulf Coast was confined to lend-lease and contract commitments. Gasolines continue sold up with little prospect of any material being available before after the first of the year. Various grades of diesel gas oils and burning oils also remain tight at firm prices.

## Mid-Continent Refiners Forced To Delay Storage Programs

PRESSURE of supplying unprecedented demand for gasoline and fuel oil to customers in the Middle West this week taxed facilities of Mid-Continent refiners and natural-gasoline manufacturers. Prices on all products are firm at unchanged levels, demand exceeds expectations to the extent that some refiners are purchasing in the open market to satisfy customers and the manufacturing end of the industry in the Mid-Continent is showing concern over inability to build inventories.

Current demand, according to customer pleas made to suppliers, is urgent and for the purpose of meeting the calls of consumers. This situation is particularly applicable to distillate fuels, including kerosene and the various grades of gas oil consumed in space and central heating plants. Colder weather in the Great Lakes region has stimulated the call for fuel oils of all grades during the past few weeks.

Curtailment of deliveries of tetraethyl lead to refinery customers, a policy of the Ethyl Gasoline Corp., for duration of the shortage of raw materials, is being offset in the Mid-Continent by two methods. Most Mid-Continent and Middle West refiners are aiming at a maximum of 72 octane for regular gasoline and some have completely eliminated offerings of premium quality and priced material. No refiner, a check at the start of this week indicated, has discontinued Q gasoline, the competitive grade.

Reasons advanced for abandonment of the premium motor fuel is twofold. In the first place, premium gasoline represents a comparatively small percentage in the gallonage of several suppliers. Also, by confining use of lead to the regular and Q grades, refiners are enabled to make their reduced rations of knock depressant cover a greater volume of the two lower grades and withdraw from a competitive position on the smallest volume of their business.

## *A.P.I. Weekly Refinery Statistics*

**Week Ended December 23, 1941**

| | Capacity reporting (per cent) | Total gasoline stocks (bbl.) | Residual fuel-oil stocks (bbl.) | Gas oil and distillate stocks (bbl.) | Daily crude runs (bbl.) |
|---|---|---|---|---|---|
| East Coast | 100.0 | 20,218,000 | 12,598,000 | 19,693,000 | 651,000 |
| Appalachian | 84.1 | 3,253,000 | 424,000 | 597,000 | 126,000 |
| Ind., Ill., and Ky. | 84.7 | 16,050,000 | 4,213,000 | 5,253,000 | 636,000 |
| Okla., Kans., and Mo. | 81.1 | 8,280,000 | 2,111,000 | 1,843,000 | 205,000 |
| Inland Texas | 64.9 | 2,403,000 | 1,221,000 | 439,000 | 132,000 |
| Texas Gulf | 91.2 | 13,372,000 | 7,860,000 | 7,069,000 | 1,023,000 |
| Louisiana Gulf | 94.8 | 2,927,000 | 2,407,000 | 1,755,000 | 158,000 |
| N. Louisiana and Ark. | 51.5 | 465,000 | 329,000 | 300,000 | 51,000 |
| Rocky Mountains | 50.4 | 1,174,000 | 320,000 | 133,000 | 50,000 |
| California | 90.9 | 15,705,000 | 62,927,000 | 12,865,000 | 548,000 |
| Total reported | 86.8 | 83,847,000 | 94,410,000 | 49,947,000 | 3,680,000 |
| Est. unreported | ..... | 5,450,000 | 1,150,000 | 1,540,000 | 390,000 |
| *Est. total | ..... | †89,297,000 | 95,560,000 | 51,487,000 | 4,070,000 |
| *Est. total previous wk. | ..... | 87,422,000 | 95,762,000 | 52,809,000 | 3,997,000 |
| *Dec. 21, 1940 | ..... | 81,411,000 | 103,318,000 | 45,198,000 | 3,585,000 |

*Bureau of Mines. †Includes 7,408,000 bbl. aviation gasoline.

## Stocks of Crude Oil in the United States

(BUREAU OF MINES ESTIMATES)

| | |
|---|---|
| Week ended December 13, 1941 | 242,683,000 barrels |
| Week ended December 6, 1941 | 244,200,000 barrels |
| Week ended December 14, 1940 | 261,293,000 barrels |

Figures do not include stocks of heavy, unrefinable California crude.

# PRICES OF REFINED PRODUCTS...

All quotations f.o.b. plant in cars for interstate or export movement except as otherwise noted

Prices as of December 20, 1941
(Most prices in cents per gallon)

The quotations are exclusive of the federal excise taxes of 1.5 cents a gallon on gasoline and 4.5 cents a gallon on lubricating oils. Octane ratings in Middle West, Mid-Continent, and Southwest are based on A.S.T.M. method of testing

## Refinery Gasoline

**OKLAHOMA (Group 3)—**

| | | |
|---|---|---|
| U. S. Motor grades: | | |
| 72-74 octane (regular) | .06 | .0625 |
| 63-66 octane | .05625 | .05875 |
| 60 octane and below | .0525 | .055 |
| 60-62 400 grades: | | |
| 72-74 octane (regular) | .06 | .0625 |
| 63-66 octane | .05625 | .05875 |
| 60 octane and below | .0525 | .055 |

**NORTH TEXAS—**

| | | |
|---|---|---|
| U. S. Motor grades: | | |
| 72-74 octane (regular) | .05875 | .06125 |
| 63-66 octane | .0550 | .06 |
| 60 octane and below | .05125 | .05375 |
| 60-62 400 | .05 | .06 |

**NORTH LOUISIANA (Ark. and N. La. delivery)—**

| | | |
|---|---|---|
| U. S. Motor grades: | | |
| 72-74 octane (regular) | .05875 | .06125 |
| 63-66 octane | .0550 | .05875 |
| 60 octane and below | .05 | .06 |

**ARKANSAS (Ark. and N. La. del.)—**

| | | |
|---|---|---|
| U. S. Motor grades: | | |
| 72-74 octane (regular) | .05875 | .06125 |
| 60 octane and below | .05 | .05375 |

**CHICAGO (Based on Group 3)—**

| | | |
|---|---|---|
| U. S. Motor grades: | | |
| 72-74 octane (regular) | .06 | .0625 |
| 63-66 octane | .05625 | .05875 |
| 60 octane and below | .0525 | .055 |
| 60-62 400 grades: | | |
| 72-74 octane (regular) | .06 | .0625 |
| 63-66 octane | .05625 | .05875 |
| 60 octane and below | .0525 | .055 |

**PENNSYLVANIA (inland refineries)—**

| | | |
|---|---|---|
| 74-76 octane (regular) | .0750 | .0775 |
| 80 octane (1939 Research) | .0775 | .0800 |

**CALIFORNIA (domestic movement)—**

| | | |
|---|---|---|
| 58-60 400, 65 oct. and higher | .065 | .0725 |
| 54-58 U. S. Motor | .055 | .0625 |

**EAST COAST (domestic)—**

| | | |
|---|---|---|
| U. S. Motor (minimum 72 octane): | | |
| New York (Bayonne)* | .08 | .085 |
| Philadelphia | .08 | .0825 |
| Boston | | .085 |
| Baltimore | .0775 | .0825 |
| Charleston, S. C. | .0725 | .0775 |

*All grades of gasoline ½ to ¼ cent less for barge shipments. New York Harbor prices are for New York and New England delivery. Prices for New Jersey delivery ¼ cent lower.

**GULF COAST (domestic)—**

| | | |
|---|---|---|
| U. S. Motor grades: | | |
| 80 plus (research) | .06625 | .0675 |
| 72-74 octane (leaded) | .0625 | .06375 |
| 70-72 octane (unleaded) | .0625 | .0650 |
| 68-70 octane (unleaded) | .0625 | .0650 |

## Natural Gasoline

**OKLAHOMA (Group 3)—**

| | | |
|---|---|---|
| Grade 26-70 | | .05125 |
| Grade 18-55 | .06125 | .0625 |

**NORTH TEXAS—**

| | | |
|---|---|---|
| Grade 26-70 | | .0475 |
| Grade 18-55 | .05625 | .0575 |

**CALIFORNIA—**

| | | |
|---|---|---|
| 75-85 375-390 | .045 | .05 |

**NORTH LOUISIANA (Ark. and N. La. delivery)—**

| | | |
|---|---|---|
| Grade 26-70 | | .0475 |

## Tractor Fuel

**OKLAHOMA (Group 3)—**

| | | |
|---|---|---|
| 40-42 gr., 315-325 i.b.p. 110-flash, 540-550 e.p. | .0375 | .03875 |
| 41-43 gr., 300-320 i.b.p. 110-125 flash, 500-520 e.p. | .03875 | .04 |
| 46-48 gr., 210-230 i.b.p. 480 max., e.p. | .04125 | .0425 |

## Kerosene

(All kerosene water white)

**OKLAHOMA (Group 3)—**

| | | |
|---|---|---|
| 42-44 | .0450 | .0475 |
| 41-43 | .04375 | .04625 |

**NORTH TEXAS—**

| | | |
|---|---|---|
| 41-43 | .0425 | .04625 |

**NORTH LOUISIANA (Ark. and N. La. delivery)—**

| | | |
|---|---|---|
| 41-43 | .04375 | .04625 |

**ARKANSAS (Ark. and N. La. del.)—**

| | | |
|---|---|---|
| 41-43 | .04375 | .04625 |

**PENNSYLVANIA (inland refineries)—**

| | | |
|---|---|---|
| 46 | .0625 | .0650 |
| 45 | .06375 | .06725 |

**CHICAGO (Based on Group 3)—**

| | | |
|---|---|---|
| 42-44 | .0450 | .0475 |
| 41-43 | .04375 | .04625 |

**CALIFORNIA (Pac. Coast market)—**

| | | |
|---|---|---|
| 38-40 high-burning test | .045 | .055 |

**NEW YORK (Bayonne, N. J.)—**

| | | |
|---|---|---|
| 41-43 | | .053 |

**GULF COAST (domestic)*—**

| | | |
|---|---|---|
| 41-43 | .04 | .04125 |

*Barge price ⅛ cent lower.

## Furnace Oil

**OKLAHOMA (Group 3)—**

| | | |
|---|---|---|
| Range oil | .04 | .0425 |
| No. 1 white (38-42) | .03875 | .04125 |
| No. 2 straw (32-36) | .03625 | .03875 |
| No. 3 zero to 10 (28-32) | .035 | .0375 |

**NORTH TEXAS—**

| | | |
|---|---|---|
| No. 1 white (38-42) | .03825 | .04125 |

**NORTH LOUISIANA (Ark. and N. La. delivery)—**

| | | |
|---|---|---|
| No. 2 (32-36) | .0325 | .035 |

**ARKANSAS (Ark. and N. La. del.)—**

| | | |
|---|---|---|
| No. 2, 32-36 | .0325 | .035 |

**CHICAGO (Based on Group 3)—**

| | | |
|---|---|---|
| Range oil | .04 | .0425 |
| No. 1 white (38-42) | .03875 | .04125 |
| No. 2 straw (32-36) | .03625 | .03875 |
| No. 3 zero to 10 (28-32) | .035 | .0375 |

**NEW YORK (Bayonne, N. J.)—**

| | | |
|---|---|---|
| *No. 1 | | .053 |
| *No. 2 | | .052 |
| *No. 3 | | .052 |

Barge deliveries ⅛ to ¼ cent under above tank-car price.

## Gas Oil and Fuel Oil

(Gas oil per gal., fuel oil per bbl.)

**OKLAHOMA (Group 3)—**

| | | |
|---|---|---|
| No. 5, low pour point (18-22) | .85 | .90 |
| No. 6, 15 and above (10-16) | .85 | .90 |

**NORTH TEXAS—**

| | | |
|---|---|---|
| No. 5, low pour point (18-22) | .80 | .85 |
| No. 6, 15 and above (10-16) | .80 | .85 |

**NORTH LOUISIANA (Ark. and N. La. delivery)—**

| | | |
|---|---|---|
| 10-14 fuel oil, industrial | .80 | .85 |

**CHICAGO (Based on Group 3)—**

| | | |
|---|---|---|
| No. 5, low pour point (18-22) | .85 | .90 |
| No. 5, 15 and above (18-22) | .85 | .90 |
| No. 6, low pour point (10-16) | .85 | .90 |
| No. 6, 15 and above (10-16) | .85 | .90 |

**PENNSYLVANIA (inland refineries)—**

| | | |
|---|---|---|
| 36-40 | .055 | .05875 |

**CALIFORNIA—**

| | | |
|---|---|---|
| Los Angeles: | | |
| 30-40 gas oil, per bbl. | 1.10 | 1.25 |
| 24 plus diesel, per bbl. | 1.10 | 1.25 |
| 24 plus diesel (bunkers) | 1.20 | 1.35 |
| 12-16 (bunkers at tidew.) | .75 | .85 |
| 10-16 (cargo lots) | .75 | .85 |
| 12-17 (tank cars) | .65 | .75 |
| 10-17 (high sulfur) | .55 | .65 |
| San Joaquin Valley: | | |
| 10-18 (tank cars) | .70 | .85 |
| 24 plus diesel, per bbl. | 1.10 | 1.25 |
| San Francisco: | | |
| 24 plus diesel, per bbl. | 1.35 | 1.40 |
| 24 plus diesel (bunkers) | 1.40 | 1.50 |
| 10-16 (bunkers) | .80 | .85 |

Lighterage charge 5c bbl. additional.

**GULF COAST—**

| | | |
|---|---|---|
| No. 2 fuel | | .04 |
| 43-47 diesel | | .04125 |
| 48-52 diesel | .04125 | .0425 |
| 53-57 diesel | | .0425 |
| 58-and-above diesel | .0425 | .04375 |
| Diesel bunkers | | 1.45 |
| Bunker C (bulk cargoes) | .85 | .90 |
| Bunker C (bunkers) | .85 | .90 |

**NEW YORK (Bayonne, N. J.)—**

| | | |
|---|---|---|
| 27 plus gas oil | | .053 |
| 28-30 diesel (lighterage 6¼c per bbl.) | | 2.15 |
| 28-30 diesel (tank cars) | | .052 |
| Bunker C (to ocean-going ships in N. Y. Harbor) | 1.35 | 1.45 |
| Industrial fuel (tank cars) | | .044 |

Lighterage charge 5c bbl. additional.

## Bright and Steam Refined

**OKLAHOMA (Group 3)—**

| | | |
|---|---|---|
| 200-210 D, 10-25 | | .27 |
| 150-160 D, 0-10 | | .23 |
| 150-160 D, 10-25 | | .225 |
| 120-125 D, 0-10 | | .225 |
| 120-125 D, 10-25 | | .22 |
| Steam refined: | | |
| 600 dark green (untreated) | | .145 |

**PENNSYLVANIA—**

| | | |
|---|---|---|
| Bright Stocks (Pennsylvania Grade No. 8 color, 140-150 at 210, 545-550 flash): | | |
| 10 pour point | | .305 |
| 15 pour point | | .295 |
| 25 pour point | .25 | .28 |
| Steam refined: | | |
| 600 | .15 | .16 |
| 650 | .155 | .165 |
| 600 flash | .16 | .175 |
| 630 flash | .17 | .18 |

## Neutral Oil

(Vis. at 100° F. except Pennsylvania and color N.G.A.)

**OKLAHOMA (Group 3)—**

| | | |
|---|---|---|
| 0-10 pour point: | | |
| 150-3 | | .145 |
| 180-3 | | .15 |
| 200-3 | | .15 |
| 250-3 | | .165 |
| 280-3 | | .175 |
| 280-4 | | .17 |
| 300-3 | | .185 |
| 350-3½ | | .19 |
| 400-3½ | | .20 |
| 500-3½ | | .205 |
| 600-3½ | | .21 |
| 100-2½ paraffin oil 10-25 | | .0825 |
| 10-25 pour point: | | |
| 200-3 | | .145 |
| 250-3 | | .16 |
| 280-3 | | .17 |
| 280-4 | | .165 |

**CALIFORNIA (moving to dom. mkt.)—**

| | | |
|---|---|---|
| Pale oils: | | |
| 200-2½-3 | .07 | .0775 |
| 300-2½-3 | .07 | .0775 |
| 400-3-4 | .0725 | .08 |
| 450-3-4 | .0725 | .08 |
| 550-3-4 | .0875 | .1075 |
| 600-3-4 | .0875 | .11 |
| Red oils: | | |
| 200-4-5 | .07 | .0775 |
| 300-5-6 | .0725 | .08 |
| 350-5-6 | .09 | .11 |
| 400-5-6 | .09 | .11 |
| 450-5-6 | .09 | .1125 |
| 500-5-6 | .0925 | .1125 |
| 600-5-6½ | .0925 | .1125 |
| 700-6½ plus | .0925 | .1125 |
| 750-6½ plus | .0925 | .1125 |
| 900-6½ plus | .0925 | .1125 |

**GULF COAST—**

| | | |
|---|---|---|
| Pale oils: | | |
| 100-3 | .0625 | .0650 |
| 200-3 | .0850 | .0875 |
| 300-3 | .09 | .0925 |
| 500-3½ | .0975 | .10 |
| 750-3½ | .10 | .1025 |
| 1,200-3½ | .1025 | .10375 |
| 2,000-4 | .1050 | .1075 |
| 3,000-4 | .1225 | .1250 |

**PENNSYLVANIA—**

| | | |
|---|---|---|
| 150 vis. at 70° F., 3 color, 400-405 flash: | | |
| Zero pour point | | .385 |
| 10 pour point | | .375 |
| 15 pour point | | .365 |
| 25 pour point | | .31 |
| 200 vis., at 70° F., 3 color: | | |
| Zero pour point | | .405 |
| 10 pour point | | .395 |
| 15 pour point | | .385 |
| 25 pour point | | .33 |

## Wax and Petrolatum

(Prices per pound)

**OKLAHOMA (Group 3)—**

| | | |
|---|---|---|
| 124-126 (A.m.p.) w.c. scale | | .06 |

**PENNSYLVANIA (inland refineries)—**

| | | |
|---|---|---|
| 122-124 (A.m.p.) w.c. scale | | .0625 |
| 124-126 (A.m.p.) w.c. scale | | .0625 |

**NEW YORK—**

| | | |
|---|---|---|
| Wax in bags fully refined: | | |
| 125-127 (A.m.p.) wax | .0560 | .0640 |
| 128-130 (A.m.p.) wax | .0560 | .0660 |
| 130-132 (A.m.p.) wax | | .0585 |
| 133-135 (A.m.p.) wax | | .0615 |
| 135-137 (A.m.p.) wax | | .0640 |
| Crude scale: | | |
| 124-126 (A.m.p.) w.s. | | .061 |
| 124-126 (A.m.p.) y.s. | | .061 |
| Petrolatum in barrels, carload lots: | | |
| Dark green | | .02875 |
| Amber | .02875 | .03125 |
| Extra amber | .03125 | .03375 |
| Lily white | .04875 | .05375 |
| Snow white | .05625 | .05750 |
| Cream | .04125 | .05250 |

Note: Most refiners are not quoting on wax pending interpretation of OPA order.

## Export Prices

### GASOLINE

**GULF COAST—**

| | | |
|---|---|---|
| 60-62 400 | .0550 | .0675 |
| 61-63 390 | .0575 | .0650 |
| 64-66 375 | .0575 | .0650 |

**LOS ANGELES—**

| | | |
|---|---|---|
| U. S. Motor grades: | | |
| Above 60 octane | .06 | .0625 |
| 65-69 octane | .0575 | .06 |
| 60-65 octane | .0525 | .055 |

### KEROSENE

**GULF COAST—**

| | | |
|---|---|---|
| 41-43 water white | .0375 | .04 |

**LOS ANGELES—**

| | | |
|---|---|---|
| 41-43 water white | .05 | .0525 |

### LUBRICANTS

(Pennsylvania Grade)

**NEW YORK (f.a.s. in bbl.)—**

| | |
|---|---|
| Cylinder stocks: | |
| 600 S.R. unfiltered | .265 |
| 630 S.R. unfiltered | .27 |
| 600 flash, S.R. | .265 |
| 650 flash, S.R. | .27 |
| Bright stock: | |
| Light, 25 pour point | .36 .37 |

### NEUTRAL OIL

| | | |
|---|---|---|
| 200-3 color | .43 | .50 |
| 150-3 color | .41 | .46 |

### PARAFFIN WAX

**NEW YORK (prices per bbl.)—**

| | | |
|---|---|---|
| 123-125 A.m.p. | .0560 | .0625 |
| 125-127 A.m.p. | .0560 | .0625 |
| 128-130 A.m.p. | .0585 | .0650 |
| 133-135 A.m.p. | .0615 | .0700 |
| 135-137 A.m.p. | .0640 | .0700 |
| Crude scale: | | |
| 124-126 w.s. | | .061 |
| 124-126 y.s. | | .061 |

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25 K.W. and 40 K.W. Gas Engines, 220 volts. D.C. Two 100 K.W. Gas Engine-Generator Sets, 220 volts, D.C. 7x6 Ingersoll-Rand ER-1 Air Compressor. Six-inch Oster Pipe Threading Machine. Also large stock of lathes, pipe machines, milling machines, etc. Send for our list.

Terms to suit.

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FOR SALE: Pipe, 5 miles 8⅝" OD, 21.31 pound, in 40 ft. lengths. Used only 4 years for gas line. Same is in first class condition. Located in Pennsylvania. If interested, write P.O. Box 574, Tulsa, Okla.

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Heavy Wisconsin Bridge and Iron 48 and 50' wide x 60—80—100 and 120' long. 16' side walls—18 & 22 Ga. Galv. Iron. Located at Madison, Wichita and Winfield, Kansas; Ada and Cushing, Oklahoma.

**NATIONAL SUPPLY CO.**
Tulsa, Oklahoma
Ph. 2-8101 Box 1710

FOR SALE
40 new Reynolds Regulators ⅛ Orifice ¾" Model 10—#1 Spring Type.
500 used #38—4½" OD Dresser Couplings.
115 used #38—6⅝" OD Dresser Couplings.
26 used #38—10¾" OD Dresser Couplings.
UNITED SUPPLY CO.
Public Service Bldg., Portland, Ore.

FOR SALE at Oklahoma City: 5—Martin 8 Steel Rim Wood Wheels, Special High Speed, 25-30 Ton, Wagons with tractor hitch, $400.00 each. Patridge. Cities Service Oil Company, Bartlesville, Okla.

4,000 FT. practically new 2⅛" Hydril drill pipe. All or part. Box A-780, The Oil and Gas Journal, Tulsa, Okla.

FOR SALE—One Thrift Hydraulic Pipe Pulling Outfit, in A-1 Condition, complete with 5", 6", 8" and 10" slips, mounted on truck. F. O. Wilkins, 201 Commerce Building, Mount Pleasant, Michigan.

FOR SALE: 6 x 16 Wilson-Snyder Power Slush Pump. Melton Supply Co., Seminole, Okla.


## HEAT EXCHANGERS

From

**Rodessa Refinery, Shreveport, La.**

1—Wyatt heat exchanger 5' 11½" long, 2' 5½" ID shell, 15/32" shell thickness; 627 ⅝" OD yellow brass tubes, 16 gauge, 6' 0" long, 585 sq. ft. surface.
1—THP heat exchanger 14' 6½" long, 1' 11" ID shell, ½" shell thickness; 184 1" OD steel tubes, 12 gauge, 15' 0" long, 710 sq. ft. surface. 500 lb. test pressure. Removable bundle.
1—Heat Exchanger 14' 0" long, 2' 7¼" ID shell, ⅜" shell thickness; 414 1" OD antimonial admiralty tubes, 14 gauge, 13' 6" long. 6 passes tube side, 1 pass shell side. 1460 sq. ft. surface.
1—Heat Exchanger 17' 7½" long, 2' 5" ID shell, 15/32" shell thickness; 400 1" OD antimonial admiralty tubes, 14 gauge 15' 7" long. 4 passes tube side, 1 pass shell side. 1710 sq. ft. surface.
1—Ross Drip-type Condenser 15' 7" high, shell 4' square, 1" shell thickness· 3000 ¾" OD admiralty bronze tubes; 16 gauge, 4' long. 2070 sq. ft. surface. 10 passes tube side, 1 pass shell side.

**PRICED ATTRACTIVELY — AVAILABLE FOR IMMEDIATE DELIVERY**

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At (Cedar Grove) Shreveport, La.
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Leonard H. Strauss, Resident Engineer

Main Office: Kansas City, Mo.
L.D. Phone 169
Harry B. Strauss, Manager


Sucker Rods, once run, in Okla. City field. Complete stock ¾", ⅞" and 1", available in truck loads of 10,000 ft. or more. These rods all alloyed. Delivered at reasonable point. Stock carried at Oklahoma City and Wichita, Kan.

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FOR SALE: International Diesel Motor U.D.-18. Almost new, complete with outboard bearing, pulley and belts. Adair-Morton Company, Wichita, Kansas.

FOR SALE: 5 x 12 Oil Well Power Slush Pump with 100 H.P. Waukesha Motor. Melton Supply Co., Seminole, Okla.

FOR SALE
One Cooper 50 H.P. Direct Connected, Gas Engine Driven Air or Gas Compressor. Power Cylinder 13 x 16. Compressor Cylinder 13 x 16. This machine is complete and in good condition, and will be operated for inspection. Price f.o.b. Shreveport, Louisiana $550.00. Box A-790, The Oil and Gas Journal, Tulsa, Okla.

**TRACTORS**
Caterpillars, crawler type, size "35" $395; size "65" with nigger head winch $795.00; Austin Western hydraulic grader 10' blade $650. O. C. Evans, Mt. Sterling, Kentucky.

FOR SALE: 1 — F-M 4" Centrifugal Pump and 10 h.p. 1200 rpm. motor. One Viking ET 4" high pressure rotary pump with 2¾ to 1 speed reducing gear. One 4" Worthington high pressure rotary pump. Miscellaneous lot pumps and electric motors with starters. One Kinney Model SD 66 rotary pump, 6" connections, on base plate with extended shaft, outboard bearing and tight pulley. Priced to sell.
CORKEN PUMP & MACHINERY CO.
206 E. Grand Ave., Oklahoma City, Okla.

FOR SALE at Oklahoma City: Large quantity 65, 70, 75 and 85 hp. oil field boilers, repaired and unrepaired. Cities Service Oil Co., Bartlesville, Okla.

FOR SALE at Crookston, Minn.: 17000 gal. oil storage tank, constructed of heavy plate steel. S. STEENERSON, Box 194, Crookston, Minn.

**Mailing Lists**

ROYALTY owners, Oil investors, Unit holders, Stockholders, Operating personnel of oil industry. Oil Industry Mailing List Co., Tulsa Loan Bldg., Tulsa, Okla.

## Red Tape Cut in Regulations On Exports of Equipment

*(Continued from Page 75)*

The creation of the clearance system does not in any way change the procedure for obtaining an export license, and the only change in priority procedure is that applications for priorities should be submitted through the Office of Export Control but on the regular OPM form.

The applicant who petitions for clearance action must present detailed information on the material to be shipped with specific reference to (*a*) its ultimate use; (*b*) the ultimate consumer; (*c*) why it is essential to the foreign industry and the economy of the foreign country; (*d*) the relationship of the quantity of the order to the normal requirements; (*e*) whether it is intended for re-export, and (*f*) information regarding the possible use of substitute material.

The applicant must also submit a detailed itemized list of all products and materials which are to be included in the proposed export clearance. Clearance proposals may be filed to cover a single order, all of the material required for one project, or material needed by an applicant to cover exports over a short period to a single country.

Requests for priority ratings should not be made until the applicant has established the fact that a rating is necessary to secure delivery, and alternate suppliers should be consulted first. If a priority rating is necessary, an attempt should be made to locate materials in storage and immediately available, or whether it is necessary to place the order with a producer of the materials.

In applying for clearance an exporter must submit a formal application for an export license on the regular yellow printed form, giving all information called for therein. If a priority rating is necessary, he should also submit at the same time an application on Priorities Division Form PD-1, filling in all blanks as fully as possible.

In addition, the applicant should also write a letter, submitting five copies, to the Board of Economic Warfare, Office of Export Control, 2501 Q Street, N.W., Washington, D. C. This letter should give full details about the proposed export, particularly covering the following points:

1. State the name, address, and nationality of company or person submitting the clearance proposal.

2. State the city and country of destination.

3. State the name, address, and nationality of the consignee in the foreign country.

4. State the name, address, and nationality of the purchaser in the foreign country.

5. Is the consignee or purchaser directly or indirectly connected with a person or firm on the "Proclaimed List of Certain Blocked Nationals?"

6. Attach a detailed itemized list of all products or materials which are to be included in this application for export clearance. Show prices and indicate whether f.o.b., f.a.s., or c.i.f., and at what points.

7. State the specific use of the materials or products to be manufactured from the materials.

8. Indicate the ultimate consumer of the materials or products to be manufactured.

9. What proportion of normal annual requirements is covered by this proposal?

10. State whether the materials or products referred to above are to be reexported and if so, to what countries and consignees.

11. Explain fully why the materials or products are deemed essential to foreign industry and the economy of the foreign country.

12. Explain why substitution of another material is not possible.

13. If an export license is required for the material, product, or accompanying technical data, attach the proper forms, and affidavits. For export licensing instructions see the "Comprehensive Export Control Schedule" published monthly by the Board of Economic Warfare.

14. If an export license has been previously applied for, state the name of applicant and date of application. If an export license has been issued, give the license number.

15. State the name or names of proposed suppliers.

16. State the proposed port of shipment.

17. When making application for a priority rating on materials to be exported, Form PD-1 is to be prepared as the form indicates with the following exceptions:

(*a*) The applicant may be an exporter, manufacturer, foreign importer, or his agent, and is not limited to a "user" as stated on Form PD-1.

(*b*) When the applicant is an American manufacturer requesting a priority rating on materials to be used in the manufacture of products destined for export, Form PD-1 will be completed in full and submitted together with the additional information called for above in paragraphs 1 to 16, inclusive.

(*c*) Applications will be submitted to the Board of Economic Warfare, Office of Export Control, Washington, D. C.

(*d*) Except where the applicant is an American manufacturer requesting a priority rating on materials to be used in the manufacture of products destined for export, omit line 3 of paragraph 1, and paragraphs 4, 5, 6b, 8, and 9 of Form PD-1.

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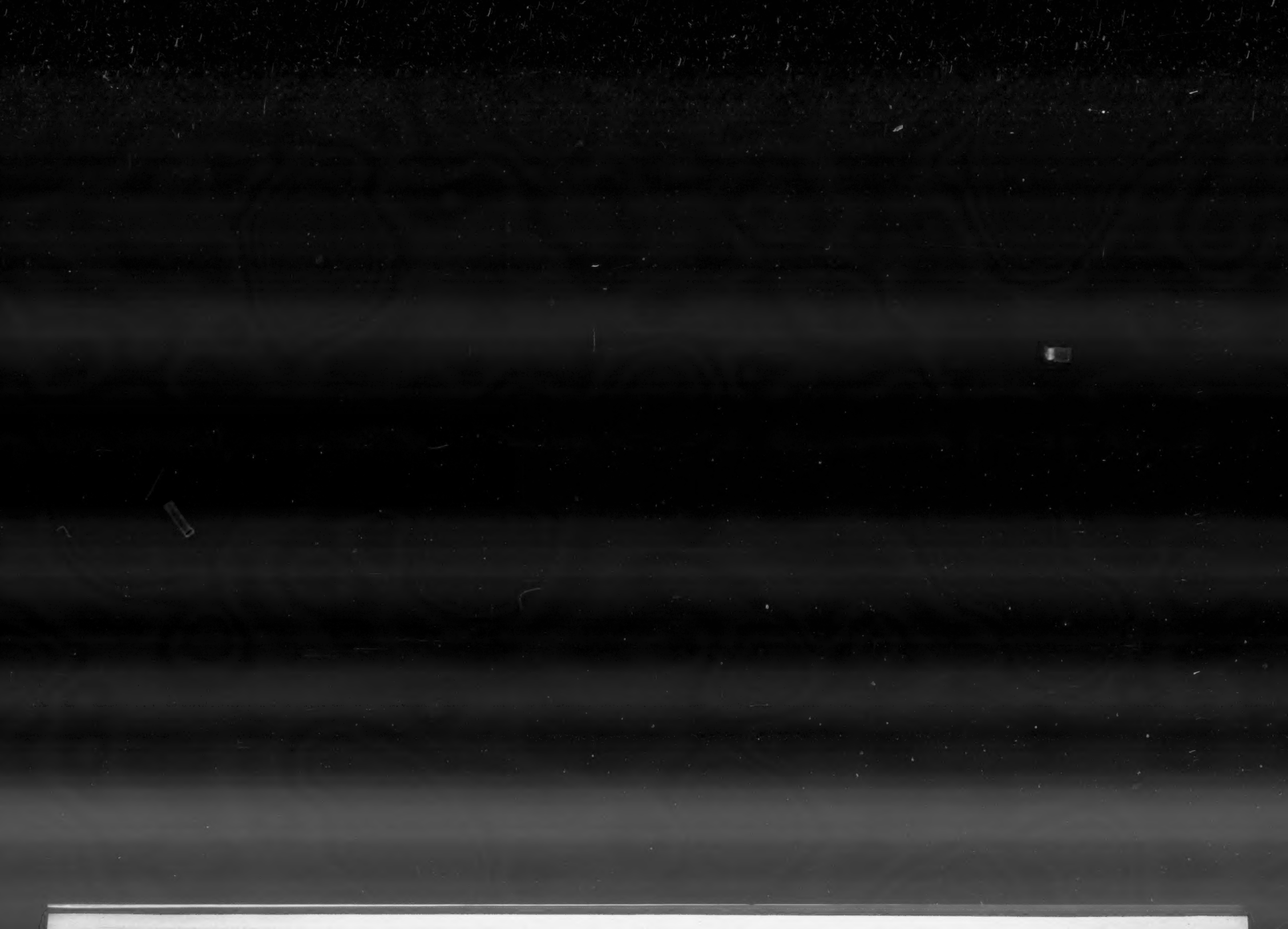
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